ELECTRICAL REVIEW

Vol. CXLVII 7th JULY 1950 No. 3789

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EDITORIAL, ADVERTISING & PUBLISHING OFFICES: Dorset House, Stamford St., London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (60 lines). Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home and Overseas £3 6s. 0d.; U.S.A. and Canada $11.00. Cheques & P.Os. (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD. and crossed "Lloyds Bank."

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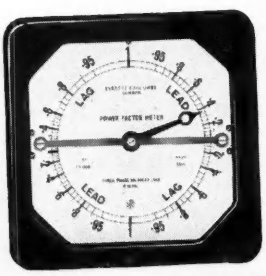

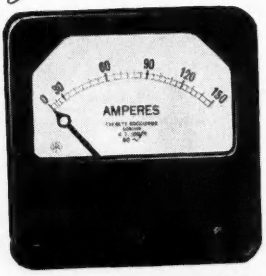

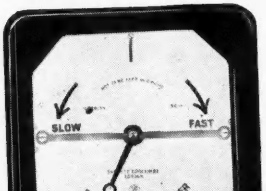

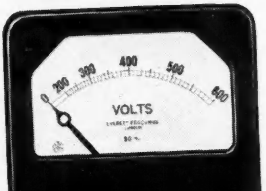

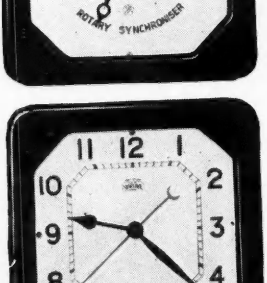

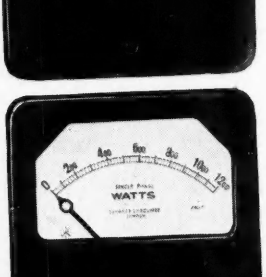

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ELECTRICAL REVIEW

Vol. CXLVII No. 3789 7TH JULY, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Bulk Transmission

TOPICS DISCUSSED AT THE C.I.G.R.E. MEETING

THE World Power Conference and the Conférence Internationale des Grands Réseaux Electriques have both been in existence for more than a quarter of a century, but their work has never had a more practical bearing than it has now. The growth of electrical demand since their inception has given an urgency to the solution of problems which may at one time have seemed largely of academic interest.

While possible limits to electricity production in all countries (the province of the W.P.C.) have long been a matter of concern, it is now more clearly recognized that this presents only one aspect. Of equal importance is it to provide means to transmit growing amounts of power over increasing route lengths from points of production to centres of distribution.

Higher Voltages

Underlying principles of transmission have been discussed at C.I.G.R.E. meetings over the years and those that promise to lead to ends realizable not very far ahead have gradually assumed greater prominence. Interest in higher voltages in relation to greater distances has received a stimulus from the Swedish 400 kV scheme, scheduled for completion in two years from now, and from the equipment of 500 kV research stations in France and the United States. The projected British 300 kV "super-grid" and experimental work up to 400 kV at Leatherhead should provide further impetus in the same direction. Consideration of corona losses at such high voltages and of system stability on account of associated lengths of a.c. transmission raises once more the potentialities of d.c. transmission, especially by submarine cable, as projected in Sweden (even if on a relatively small scale) for four years hence.

Wide Range of Subjects

Such forward-looking schemes have not, however, been allowed to overshadow the less spectacular but ever-present need to get the most out of, and to improve, existing techniques, which provide themes for the majority of the 142 papers being presented at this year's C.I.G.R.E. meeting in Paris (29th June to 8th July). The seventeen by British authors illustrate the scope of the proceedings. These range from the use of radio frequencies over power networks and the almost negligible interference with communications caused by the latter, to proposals for a four-conductor three-phase 400 kV transmission system with rapid reclosure of circuit breakers.

In between come such subjects of immediate bearing as protective-gear maintenance, overhead line practice (one paper dealing with unearthed steelwork on wood poles), lightning-fault statistics, styrene barrier joints and terminations of cables and the British method of successfully sheathing cables with alumin-

ium. Transformers provide the subject for two papers, one of which discusses differences of opinion about operation, particularly overloading, and the other describes a new winding having interleaved conductors to improve impulse-voltage distribution. The importance of restriking voltage as affecting circuit-breakers, both oil and air-blast, is reflected in three papers, one of which allocates the fields for linear and non-linear shunt resistances.

Increasing railway electrification (as well as the ultimate possibility of extended d.c. transmission) lends especial significance to a paper on harmonics in rectifier circuits. Power-factor correction is dealt with from two angles, one being a discussion of the merits of synchronous condensers with non-laminated steel poles and the other a report of tests on capacitor oils.

Apart from the value of the exchange of experience with engineers from the forty countries represented at C.I.G.R.E., British engineers are traditionally concerned to design schemes and manufacture equipment for countries in which more advanced practice is called for than may be immediately essential for home needs.

CONTRACTORS' ASSURANCE

Last week's comments upon the inadequate representation of electrical contractors at the Harrogate Convention have brought an assurance that the Convention has the full support of the Electrical Contractors' Association. This is most satisfactory, for we want to see the E.C.A. taking its rightful place in this gathering of the whole industry. Without it the object of the Convention cannot be fully achieved and conditions demand that the closest contact shall be maintained between contractors and the other branches.

COLLIERY POWER

Provision of more and cheaper power is stated by the National Coal Board in its annual report to be an essential part of its reconstruction plans. It visualizes requirements amounting to 1,300,000 kW by 1955 and during last year was engaged in working out a national policy for the supply of electric power to collieries. Much of the present equipment is inefficient and often good-quality coal has to be burned. It is stated that the Board aims to build colliery power stations in units of a standard size (comparatively small in relation to those of the British Electricity Authority) which would be designed for the efficient consumption of low-grade fuel. There is no hint of the B.E.A.'s reaction to the proposal, but the questions involved have been under discussion with the Authority, together with such matters as transmission and stand-by supplies. Commenting on these and other developments mentioned in the report, Lord Hyndley, the chairman, observes that the industry "bristles with technical problems."

WAGES STANDSTILL ENDED

While the Trades Union Congress still recognizes the need for restraint in the matter of wage claims it has decided that there must be greater "flexibility" of wage movements than the declaration of policy made last January allowed. It was forced to this decision by the unwillingness of a number of unions to follow the line laid down. An offer of consultation is made by the T.U.C. to unions desirous of putting forward claims. One reason for Congress's altered attitude is the growing pressure for the preservation of the "differentials" between the wages of skilled and unskilled which are being narrowed by the consideration which is now being given to lower-paid workers.

M.K.S. UNITS

The considered opinion, expressed on another page, of the outcome of the recent discussions at the Institution of Electrical Engineers on the M.K.S. system of electrical units is an indication that the authors of the four papers debated on that occasion are personally satisfied that the use of the rationalized M.K.S. system is the expressed wish of the whole electrical profession. The views expressed were almost unanimous. The many university representatives were emphatic in their advocacy of the change and speakers in Manchester, including industrial representatives, were somewhat unexpectedly stronger still than those in London in favour of speedy unification of current practice.

1. King's College. 2. Cavendish Laboratory. 3. Pembroke College [*Aerofilms*]

Research in Cambridge

Remarkable Range and Diversity

Some of the laboratories mentioned in this article are being visited this week by members attending the summer meeting of the Institution of Electrical Engineers

By G. E. MIDDLETON*

SINCE the days in the last century of Clerk Maxwell and J. J. Thomson electrical research has been traditional to Cambridge, and it is fitting now to review how far the range has been extended since those early days. At one time a conception of electricity was limited to a few remote scientists, but to-day no technical work of any sort could afford to ignore the advances of electrical knowledge, whether of a fundamental nature or as an applied science. Research itself has changed, too. Once a distant and mysterious pursuit, it is now a lusty and ubiquitous part of the life of a scientific community; and no place has a better claim to be in the vanguard of electrical advance than Cambridge.

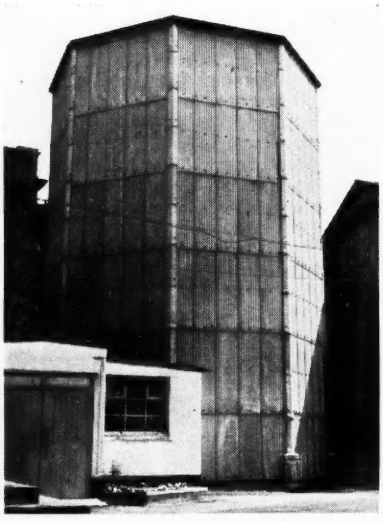
The work of research in Cambridge University is housed in a number of "Schools," each specializing in some aspect or type of research, and the range now covered in electrical matters alone is astonishing. Present-day work involves electricity in all its forms, from infinitesimal charges, scarcely detectable, to high voltages or large currents in huge devices requiring large buildings to house them and to protect the operators.

Nowadays one can rely on generous Government support in most branches of the work. Students are encouraged to develop any research ability they may have, and monetary grants are provided for apparatus and buildings on a scale unheard of less than a generation ago. The large industrial concerns, too, which directly and indirectly have always been most generous in their development and support of University research, are now more than ever providing funds and equipment to further the cause of research. Practically all notable laboratories in Cambridge bear the honoured name of a generous benefactor, and it is to the practical imagination of such men as Ludwig Mond, Lord Austin and many others, to say nothing of the trustees of the Rockefeller Foundation, that much of Cambridge's resources in research are due to-day.

* Lecturer in Engineering, Department of Engineering, University of Cambridge

For engineers, of course, the centre of interest is the Engineering Laboratory. The present building dates from 1921 and was chiefly the result of a munificent gift by the late Sir Dorabji Tata, but it was expanded considerably before the war; now, a five-storey block just being built will make it second to none in the country. The Electrical Department itself initiates and fosters research work from electronics to power engineering, utilizing its wide range of apparatus to enable detailed investigations to be conducted into many phenomena, known but not explained, in the world of engineering. The subject of iron losses is closely studied both in apparatus and more fundamentally in the Magnetics Laboratory, while acceleration and vibration problems are isolated and analyzed in many forms.

The Laboratory is building its own electron microscope, and it has devised an automatic plotter for electron trajectories which is working in conjunction with a differential analyser. A new digital computor is being constructed which can be used with the electrolytic tank of the plotting device. Much work is being done on fluctuation noise in valves and resistors, including flicker noise, especially in semi-conductors. An air-conditioning chamber for humidity and other measurements can be controlled to limits of 0.001 deg C at ordinary temperatures. The variety and design of the apparatus involved has led to the establishment of a finely equipped workshop which can produce the most novel apparatus with a high standard of finish and performance.



Tower enclosure of electrostatic generator

Mention must be made of the associated techniques of electrical measurement and control used for research in the other departments of the Engineering Laboratory. Strain gauges, special pressure gauges, timing devices and speed controls all necessitate electrical work of a special nature, while illumination, photometry and high-speed photography have all relied on electrical development.

Many other laboratories, too, depend on the most modern developments of electricity to further their research. Even such subjects as botany and biology today are dependent on electrical devices, from X-rays to isotopes, while medicine and agriculture, even zoology, use these and other devices in their researches. The study of neurology, for instance, is largely electrical in its fundamentals, while a thriving Department of Radiotherapeutics is studying the new types of radiation, especially of high-energy X-rays. A 30 MeV synchrotron is installed in a specially designed housing for it in Addenbrooke's Hospital and the work is recognized by the Medical Research Council for the study of applications to radiotherapy. Close collaboration is maintained in this connection with the Royal Cancer Hospital, London. The Department of Radiotherapeutics also utilizes radio-active tracers for the study of doses of ionizing radiations on tissues and tumours, both animal and human. Other medical work includes the study of heart-beats by electrical-acoustical methods.

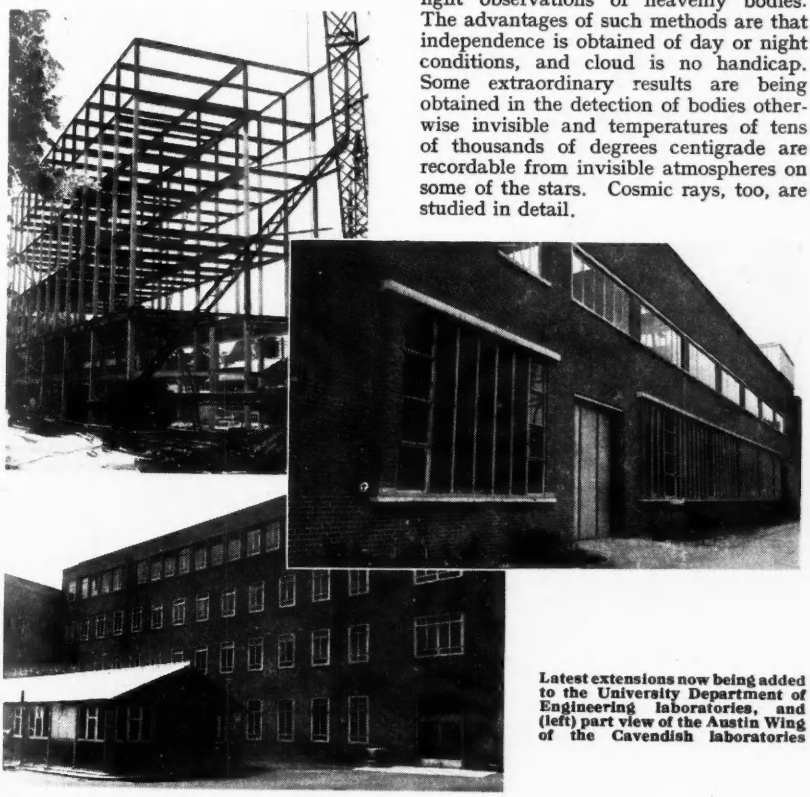
Most well known of all laboratories perhaps is the Cavendish. Originally the gift of William Cavendish, 7th Duke of Devonshire, this laboratory of experimental physics has grown out of all recognition, mainly as the result of its work on fundamental electrical properties. Many additions to its buildings have been made in recent years, including the Royal

Society Mond Laboratory, which was built to provide for the research work of P. Kapitza, particularly at low temperatures and in intense magnetic fields.

The Austin Wing was built from donations of the late Lord Austin of Longbridge and was opened in 1939. It houses the High Voltage Laboratory, the one million and two million volt generators of which are in a lofty room to accommodate the insulators, while in the research rooms associated with them the workers have sometimes to be guarded against some of the fast electrons produced outside the apparatus. Other rooms contain the cyclotron and the linear accelerator. Development work is proceeding with the five million volt Van der Graaff generator which, when established, should have an output of several hundred microamperes.

Now that the uses and possibilities of atomic physics claim popular attention it must not be forgotten how much of the work was pioneered in the Cavendish Laboratory at a time when the division of the atom was but a fantastic conception of the inquisitive few. Now the development of nuclear research in Cambridge is so great as to burst the bounds of the Cavendish Laboratory and plans are actively advanced for a large new building to be erected on the outskirts of the University town.

Research at the Cavendish is by no means confined, however, to nuclear physics. A very active section uses radio and radar techniques in radio-astronomy and much work is being done on the daylight observations of heavenly bodies. The advantages of such methods are that independence is obtained of day or night conditions, and cloud is no handicap. Some extraordinary results are being obtained in the detection of bodies otherwise invisible and temperatures of tens of thousands of degrees centigrade are recordable from invisible atmospheres on some of the stars. Cosmic rays, too, are studied in detail.

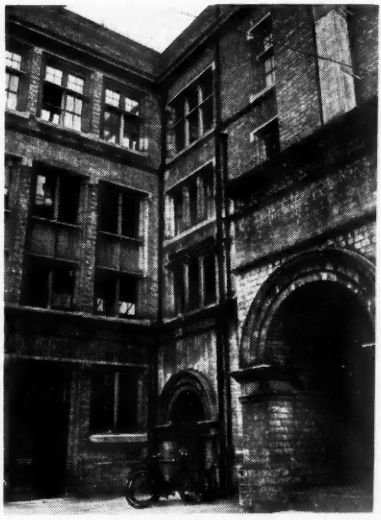


Latest extensions now being added to the University Department of Engineering laboratories, and (left) part view of the Austin Wing of the Cavendish laboratories

Radio-wave propagation through the ionosphere, especially in the "E" region, is being closely studied on all wavelengths. Much work is done on the very long wavelengths associated with atmospherics, while the study of clouds by radar and other branches of meteorological physics are being actively pursued both by the Laboratory and the University Observatories. Electrical apparatus for the study of raindrops has been highly developed.

Special electrical properties of materials receive close study in the Cavenish Laboratory; for example, the phenomena of superconductivity, the properties of the barium-titanate ceramics and the characteristics of transformer irons, while supersonic phenomena demand increasing attention. The E.R.A. has from time to time profitably availed itself of the electrical research facilities in this University's laboratories.

No description of electrical research would be complete without reference to the University Mathematical Laboratory. Here are housed the differential analysers and other calculating devices, but the chief electrical development is the "EDSAC" electronic calculator, in which many of the constituents are well in advance of those of American calculators. While the "EDSAC" is an advanced development itself, it is actually used systematically for calculations otherwise too lengthy to be practicable and many of these calculations are for electrical problems, such as those of power-system stability. It is Professor Hartree who has pointed out that new ways of thinking are stimulated, now that calculations are quickened to the same spectacular degree as if a journey from London to Edinburgh could be done in a minute or two, and it is in such vision that research in Cambridge finds its inspiration.



A corner of the Mathematical Laboratory

Tensor Club

TO electrical engineers the word "tensor" is associated principally with the name of Gabriel Kron, of the General Electric Co., Schenectady, N.Y., who pioneered the application of tensor analysis to electrical engineering. These methods of analysis aroused world-wide interest which extended also to the allied subjects of dyadics and matrices. They have been taken up and studied by some engineers in Great Britain, but unfortunately each individual has hitherto worked to a large extent independently. This isolation tends to discourage many from persevering with the subject after difficulties have been encountered and it causes duplication of effort.

The Tensor Club of Gt. Britain has been formed with the intention of putting all such engineers into touch with one another, and to promote the extended and increasing use of the techniques developed by these methods. The Club—in the early stages at least—will necessarily further its objects by correspondence. Membership is open to all those who are actively interested in determinants, dyadics, matrices, or tensors, and their application to engineering, wherever they may reside. There is no entrance fee: members pay an annual subscription of one guinea and associate members half a guinea. The Club's organizers are Mr. S. Austen Stigant, 7, Courtlands Avenue, Hayes, Kent, and Mr. W. J. Gibbs, 53, Hillmorton Road, Rugby.

I.E.E. Awards

THE Institution of Electrical Engineers has issued a list of awards of premiums for papers read or accepted for publication during the 1949-50 session.

PERSONAL and SOCIAL

News of Men and Women of the Industry

At the annual general meeting of the British Internal Combustion Engine Research Association held on 28th June, **Viscount Falmouth,** M.I.Mech.E., Companion I.E.E., was re-elected president of the Association for 1950-51.

Mr. T. Catten, F.I.E.S., has joined Falk, Stadelmann & Co., Ltd., as departmental manager at their head office in London. Mr. Catten obtained his early electrical instruction at the Polytechnic, Regent Street, and served with Troughton & Young before joining the staff of the E.L.M.A. Lighting Service Bureau, where he ultimately became a specialist in the commercial and industrial lighting fields. He assisted in the opening of the Manchester Bureau and its operation for the first year, after which a further three years was spent in London before he was appointed district engineer to the Lighting Service Bureau of Scotland in 1930. He held this position until 1937 when he joined the Lighting Department of the British Thomson-Houston Co., Ltd., and, among other important activities during the last war, was appointed site engineer for the underground factory at Corsham, where 1½ million sq. ft of machine area was lighted. Since the war he has devoted most of his time to marine lighting. Mr. Catten has been a member of the Illuminating Engineering Society for nearly 20 years; he is an ex-Council member, and played a prominent part in the formation of both the Glasgow and the West of England Centres.

Mr. T. Catten

Mr. H. North, resident engineer at Stourport power station for the past twenty-five years, who has completed forty-eight years in the electricity supply industry, was last week presented with a television set and a gold watch from his colleagues to mark his retirement. The presentations were made at the power station by Mr. F. W. Lawton, controller of the B.E.A. Midlands Division. Mr. North served with the Brush Electrical Engineering Co., Ltd., at Loughborough, before going to the Kidderminster area, where he joined the British Electric Traction Co. Later he was boiler house superintendent at Smethwick power station and resident engineer at Springs Mire power station, Dudley. In 1925 he became the first resident engineer at the Stourport station.

Mr. L. E. Brickwell, at present station superintendent at Earley generating station, has been appointed superintendent of the new station at Poole, Dorset, of the Southern Division of the B.E.A. He will be succeeded at Earley by **Mr. C. J. Stockell,** B.Sc.(Eng.), A.M.I.E.E., A.M.I.Mech.E., A.M.Inst.F., who is at present assistant station superintendent there.

Mr. Brickwell joined the Stirling Boiler Co. in 1929, and in 1942 was appointed efficiency officer at Hayle power station, subsequently holding the same position at Little Barford until his appointment in 1944 as deputy superintendent at Earley, where he has been station superintendent since vesting date.

Mr. Stockell received his technical education at Queen Mary College, London University, and his practical training with

Mr. L. E. Brickwell

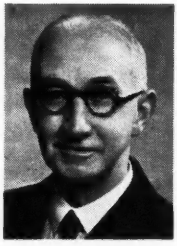
Mr. C. J. Stockell

Crompton Parkinson, Ltd., West Ham Corporation Electricity Department, and the Hackbridge Electric Construction Co., Ltd., In 1939 he entered the supply industry as junior engineer at Portsmouth, successively holding various posts in the generating station until 1947, when he

was appointed mechanical engineer at Meaford. A year later Mr. Stockell returned south to commence duties as assistant station superintendent at Earley.

Mr. S. R. Siviour, O.B.E., M.I.E.E., chief engineer to the Yorkshire Electricity Board, is retiring at the end of this month and will be succeeded by **Mr. J. D. Nicholson,** B.Sc., A.M.I.E.E., who is at present deputy chief engineer.

Mr. Siviour received his training at the Croydon electricity works and with Callender's Cable & Construction Co., Ltd., with whom he later became assistant engineer. He joined the Yorkshire Electric Power Co., in 1911, as chief assistant, mains construction, becoming mains construction superintendent in 1922, and deputy general manager in 1947. He was appointed chief engineer of the Yorkshire Electricity Board in 1948. Mr. Siviour, who is a past-chairman of the Transmission Section of the Institution of Electrical Engineers and of the North Midland Centre of the Institution, is a member of a number of Committees of the B.S.I. and E.R.A., and is a member of the British National Committee of the C.I.G.R.E. Mr. Siviour is attending this week's Paris conference at which he is presenting, jointly with Mr. K. L. May, of the Southern Board, a paper entitled "The Trend of High Voltage Overhead Line Design for Distribution in Great Britain."



Mr. S. R. Siviour

Mr. J. D. Nicholson

Mr. Nicholson gained his early experience at Pinkston power station, Glasgow, and before the nationalization of the industry was with the Scotland, Mid-East and North East England Areas of the Central Electricity Board. Before going to Yorkshire as deputy chief engineer of the Board in 1949, he was section head (engineering), planning and development, with the South West Scotland Electricity Board.

Mr. A. Clegg, F.C.I.S., F.C.W.A., who, since vesting date has been engaged on work in connection with the financial transfer of the Yorkshire Power Co. to the Y.E.B., is also retiring at the end of July. Mr. Clegg joined the Yorkshire Electric Power Co. in 1906 as a junior clerk, and became chief accountant in 1911, being responsible for the preparation of the balance sheets of the company and its subsidiaries until 1948.

During the visit of Lord Citrine, chairman of the B.E.A., to the Board's area headquarters at Scarcroft on 28th June (reported on page 33), Mr. W. M. Lapper, chairman of the Board, presented Mr. Siviour and Mr. Clegg, on behalf of the staff, with a silver tea service and salver respectively.

In splendid weather the London establishment of the **General Electric Co., Ltd.,** held their championship and silver jubilee sports gala at their Wembley ground on Saturday last. A long programme of varied events was efficiently carried through resulting in an easy win by Head Office representatives who secured 49 points, the runners up being the Osram Works with only 18. A number of sideshows and an excellent tea added to the enjoyment of the event. At the conclusion of the sports the many cups and prizes were presented by Lady Railing who was accompanied by Sir Harry Railing (chairman of the company) and Mr. T. W. Heather (director).

Mr. E. C. Green, who recently resigned his position as manager of Thorn Electrical Industries, Ltd., has been appointed London's sales manager of Huwood Components, Ltd. (Domestic Appliance Division) His first task will be the sales promotion in the South of England of the Lammix mixermincer.

Mr. E. C. Green

Mr. P. Hickson, for many years technical director of Ardente Acoustic Laboratories, Ltd., has joined the John Lewis Partnership, Ltd., as director of buying for radio, television and all electrical appliances.

Golfers from the four factories of **Ferranti, Ltd.,** at Hollinwood, Moston, Edinburgh and in Canada, played on 23rd June simultaneously in Manchester, Scotland and Canada for the trophy presented by Sir Vincent de Ferranti for annual competition. Hollinwood, who won it in 1949, were again successful this year, and Mr. W. G. Murdoch, on the sales staff, playing over the course of the North Manchester Golf Club, was the winner with a score of 90 − 19 = 71 net, 5 shots under the bogey of the course (76). The best Edinburgh could produce was Mr. Bigg's 72 net on a 74 course, and Mr. Brunning, of Canada, did 71 on a par

70 course. Mr. Murdoch will hold the trophy for twelve months and receive a replica for permanent retention.

The General Electric Co., Ltd., has appointed **Mr. P. E. Wheatland** to succeed Mr. F. G. Quance, A.M.I.E.E., as manager of the company's Accessories Department. Mr. Wheatland joined the G.E.C. in 1912 and was engaged in the company's counting house and Engineering Department before serving in the London Scottish during the 1914-18 war. On his return from service he spent a period at the Witton Works and then joined his father's firm, H. C. Wheatland & Co., electrical contractors, in order to obtain installation experience. He rejoined the G.E.C. four years later, working in the Small Motors and Fans Department and in 1932 transferred to the Sales Department where he remained until 1939. He then joined the Government and Railways Department, and was appointed assistant to Mr. F. G. Quance in the Accessories Department in 1946. Mr. Wheatland will also represent the company on the B.E.A.M.A. Accessories Section and has already been appointed to the Standing and Technical Committees of that body.

Mr. P. E. Wheatland

Mr. H. Watson-Jones, M.Eng., M.I.E.E., M.I.Mech.E., M.I.Min.E., divisional chief engineer to the North Western Division of the Coal Board, has been appointed divisional chief engineer (mechanical and electrical) to the new Durham Division of the National Coal Board with effect from 1st July

Mr. H. Watson-Jones

Mr. Watson-Jones received his early practical training with the Mersey Docks and Harbour Board. He saw service in the Royal Navy during the 1914-18 war and later took his engineering degree at Liverpool University. After graduating he joined Metropolitan-Vickers Electrical Co., Ltd., Manchester, in 1922, and on completion of his practical training was employed as an installation engineer on the north-east coast, as liaison engineer with the American Westinghouse Co., and as senior engineer in the General Engineering Department. In 1937 he was appointed manager of the Birtley Co., Ltd., Co. Durham, returning to Metropolitan-Vickers in 1939 as head of the Mining Department. He joined the North Western Division of the Coal Board on vesting date, and during the last three years has served on the local committees of both the Institutions of Electrical and Mechanical Engineers. He is a member of Council of the Association of Mining Electrical and Mechanical Engineers and has been elected a vice-president.

The Brightside Foundry & Engineering Co., Ltd., Sheffield, announces that **Mr. W. S. Richards** has been appointed a director.

Mr. E. Peacop, who has been connected with the sales organization of Walsall Conduits, Ltd., for the past thirty years, and who, since January, 1949, has been London manager, has been elected to the board of directors.

Mr. E. Peacop

A golf competition is being held by the **I.E.E. Southern Centre** on 26th July at Stoneham Golf Club, Southampton, in aid of the I.E.E. Benevolent Fund. The tournament will include an 18-hole model competition under handicap, an 18-hole four ball better ball competition under handicap against bogey, and a putting competition. The cost for the day will vary from 10s to 28s 6d according to the number of competitions and optional sweeps entered for and whether lunch and tea are required. Applications for entry forms (to be returned by 18th July), should be made to Mr. W. P. Conly, local hon. treasurer, I.E.E. Benevolent Fund, "Five," Shanklin Road, Southampton.

Photograph No. 4 appearing on p. 1214 of our 23rd June issue (Harrogate Convention) was given the title "Mr. and Mrs. Dixon." Actually it showed **Mr. G. T. Dickson** (J. A. Crabtree & Co.) and his wife.

Serving apprentices of the Willesden Works of the **British Thomson-Houston Co., Ltd.,** were hosts to nearly 200 parents and guests at a Parents' Day on 1st July. The event was held at the company's switchgear works in Neasden Lane. Guests were conducted around the factory by apprentice guides and several demonstrations were arranged. After tea, the manager, Mr. H. E. Cox, welcomed the guests, and Mr. E. A. Alexander, general superintendent, commented upon the entries for the annual "East-

hope" essay competition. Prizewinners were given certificates and book tokens and, in addition, Mr. R. M. Tregear was awarded a silver medal for the best essay of the year. Presentations were made by Mr. H. L. Satchell, a director of the company and manager of the Rugby works. The results of the drawing office examination were announced by the apprentice supervisor, Mr. I. H. Child, and the afternoon concluded with a vote of thanks by the Apprentice Association chairman, Mr. G. Ashby.

The staff of **Philips Electrical, Ltd.,** have given £80 to the Lord Mayor's National Thanksgiving Fund. The company has a factory in Australia whose employees have sent a number of food parcels from time to time to the company's staff in this country.

OBITUARY

Mr. A. R. Page.—The death occurred on 16th June, after a long illness, of Mr. A. R. Page, A.M.I.Mech.E., A.M.I.E.E., Northern Area manager for J. H. Tucker & Co., Ltd. He had been responsible for Tucker interests in the North of England for the past twenty-five years.

Mr. George Wellington Moore who, up to his retirement in 1936 was manager and a director of Automatic Telephone & Electric Co., Ltd., Liverpool, has died, at the age of seventy-seven, in Cape Town, where he had made his home. He leaves a wife and daughter.

The late Mr. G. W. Moore

Following an apprenticeship to telegraph engineering in the British Post Office factory, Mr. Moore emigrated to Cape Colony. In 1899, upon the outbreak of the Boer War, he was called upon to increase the capacity of the telegraph lines to meet military requirements and designed a chain of quadruplex repeaters and high speed Wheatstone circuits which did much to improve communications throughout the Colony. He joined the Automatic Telephone Co. shortly before the 1914-18 war as a telegraph engineer. Though living in retirement in South Africa, he took an active interest in the affairs of Automatic Telephones (South Africa), Ltd., Johannesburg, a subsidiary of the Liverpool company, and was its chairman until his health broke down in February this year.

Mr. Alex. Lindsay, M.I.E.E., who has died at his home in Glasgow at the age of seventy-four, was principal of the firm of Alex. Lindsay, Ltd., electrical engineers and contractors, Bath Street, Glasgow. He was a former chairman of the Scottish Centre of the Institution of Electrical Engineers, a past-president of the E.C.A. of Scotland, and for the last ten years had been local hon. treasurer of the Benevolent Fund of the I.E.E.

WILLS

Mr. J. R. E. Daft, Associate I.E.E., manager of the Hereford District of the Midlands Electricity Board, who died on 4th November last, left £2,633 gross (£2,310 net).

Mr. F. H. Bevan, manager of the Leeds branch of London Electric Wire Co. & Smiths, Ltd., who died 26th Feb. last, left £2,303 gross (£2,256 net).

Mr. R. P. C. Wilson, C.B.E., M.Inst.C.E., M.I.E.E., consulting engineer, who died on 20th March last, left £5,035 gross (£4,732 net).

Mr. R. E. Shawcross, A.K.C., M.I.E.E., a former lecturer in electrical engineering at King's College, London, who died on 24th March last, left £107,044 gross (£106,628 net).

Mr. W. M. Harris, A.M.I.E.E., consulting engineer, at one time a director of Gilbert Gilkes & Gordon, Ltd., who died on 23rd December last, left £2,711 gross (£2,606 net).

Mr. W. J. Cusack, for over forty years in the service of the British Thomson-Houston Co., Ltd., who died on 6th February last, left £9,603 gross (£9,553 net).

British Engineers' Association Handbook

THE 1950 edition of the "British Engineers' Association Classified Handbook of Members and their Manufactures" now published is a stoutly bound volume of 655 pages of reading matter and advertisements. A comprehensive classified list of the manufactures of members, which is distinctively printed on a different coloured paper, will be of great assistance to purchasers of engineering equipment. The foreword deals with progress in the engineering industry and pays tribute to the work of the research organizations which serve the industry. This edition will be received gratis by overseas buyers and agents in every country in the world which has business with the British engineering industry, the distribution overseas being made to 115 countries, including a special distribution to Canada and the United States.

Printing Press Drives

Demonstrations at Hebburn

At the Hebburn-on-Tyne works of A. Reyrolle & Co., Ltd., last week, we saw a series of demonstration tests on modern schemes of electrical drive and control for printing presses arranged for the benefit of engineers representing the national newspapers and printing press manufacturers.

The essential operating features are fine inching control; uniform crawling at about 2 per cent full speed; smooth take-over from crawling and running-up; and smooth stepless and efficient speed control over the printing range. For d.c. supplies compound wound motors with shunt speed regulation over the printing range and a small motor with an over-running clutch for inching and crawling has become the accepted standard since it was introduced 50 years ago.

Developments have been largely ones of detail rather than of principle; for example, the change from hand to fully automatic control, the introduction of the unit drive and more recently, the co-axial drive, but the principle remains that of a duplex drive. There have, however, been a few installations using a separate low voltage d.c. supply on the main motor instead of the usual inching motor with over-running clutch.

Power supply and distribution is now almost exclusively a.c. and various types of a.c. commutator motors have been used to give speed regulation with small

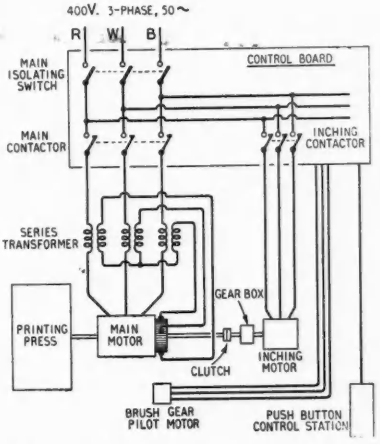
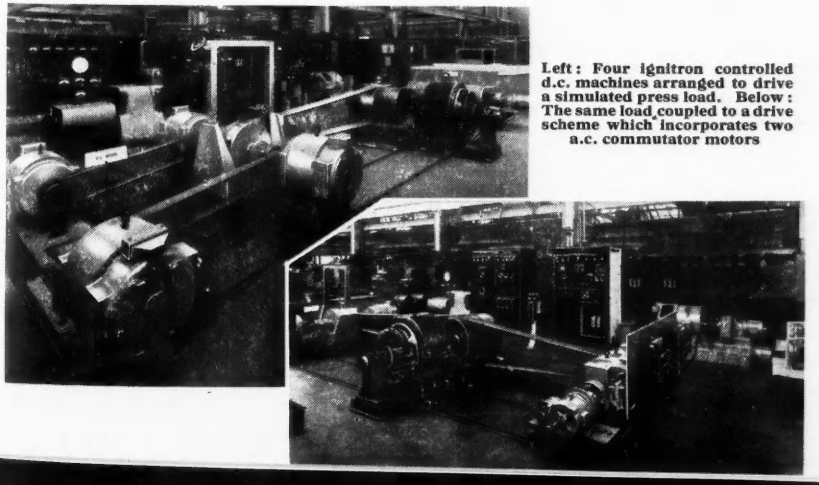


Fig. 1.—Elementary circuit diagram for a.c. commutator motor drive

induction motors over-running clutches for inching and crawling. These arrangements have been in normal use for about 20 years and can now be made to operate as well as their d.c. equivalent.

For newspaper press drives the company normally uses the a.c. commutator motor which has a torque/speed characteristic similar to that of the combined motors used for d.c. drives. It is of simple construction and has the good



Left: Four ignitron controlled d.c. machines arranged to drive a simulated press load. Below: The same load coupled to a drive scheme which incorporates two a.c. commutator motors

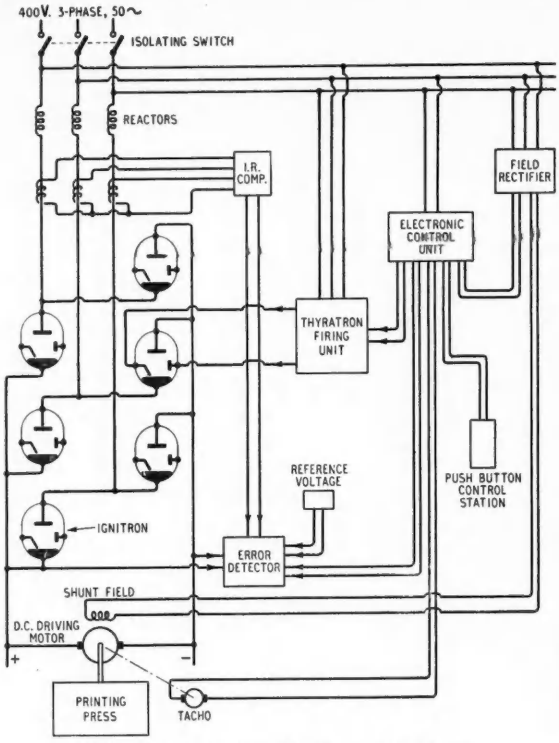
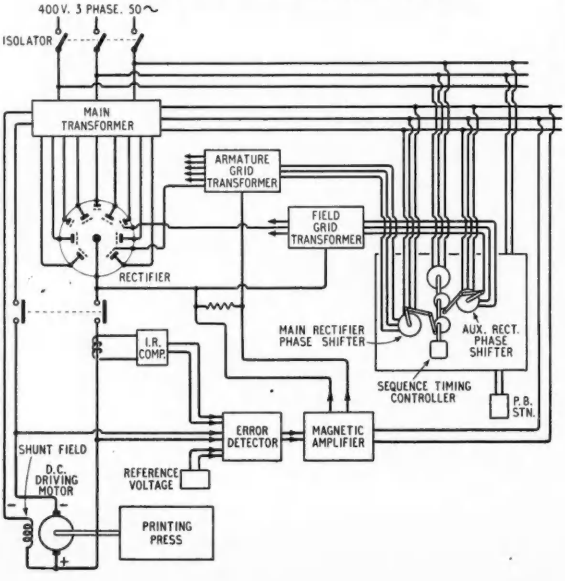


Fig. 2.—Basic arrangement for d.c. motor scheme incorporating electronically controlled ignitrons

Fig. 3.—This scheme for d.c. machines uses a magnetic amplifier grid-controlled mercury-arc rectifier



load - sharing characteristics essential for parallel operation.

At present there is little difference between the a.c. commutator motor and the d.c. drives, but the former is more expensive, although the difference in cost is not so much that it is economical to use d.c. motors and pay the cost of conversion to constant voltage d.c. It is possible that recent developments in variable voltage conversion equipment and its control gear have made conversion an economic proposition in certain circumstances. It was with this aspect that the demonstrations were mainly concerned.

Conversion by grid controlled mercury-arc rectifiers, ignitrons or thyratrons, with either thermionic voltage or magnetic amplifiers and some form of servo-loop control, are often described as electronic drives, although the most interesting feature is the servo-loop which is not necessarily electronic or even electric. Essentially, this is an error-actuated control system, where the control operation is a function of the result and involves an error detector, an amplifier and stabilizers. The advantage of this arrangement is that control down to inching and crawling speeds can be obtained without separate inching motors and their over-running clutches.

For demonstration purposes the company had on test last week a number of a.c. and d.c. press-driving motors with loading arrangements to simulate a press load. A generator gave loads at higher speeds and a friction brake with a "stiction" device simulated load conditions of a press at break-away.

This load was driven first by the a.c. motor equipment, and its performance was subsequently compared with that of

the d.c. equipment with ignition rectification.

The a.c. commutator motor driving equipment (see Fig. 1) comprised motors having compound torque/speed characteristics with a geared inching motor and over-running clutch together with the control cubicle with the usual automatic features. The speed was controlled by pilot motor-operated brush movement with the selsyn units keeping the brush gear of the two machines in step, thereby ensuring good load sharing and absence of sparking. The induction type inching motors have been designed to give starting characteristics ideal for the purpose and it was seen that the equipment fulfilled all the requirements of drive to which reference has previously been made. Electromagnetic brakes are fitted to these motors for rapid deceleration in case of emergency.

The scheme next demonstrated (see Fig. 2) incorporated electronically controlled ignitrons with d.c. motors and consisted of a combined rectifier and control cubicle with a number of d.c. driving motors in parallel. This scheme has been evolved by the technical staffs of the Philips and Reyrolle organizations. The ignitrons and electronic chassis are of Philips' manufacture and Reyrolle have housed these together with their own switchgear and electromagnetic equipment into a combined rectifier and control cubicle.

The 400 V 3-phase a.c. supply is taken direct to the water-cooled ignitrons for conversion to d.c. The power output is 240 kW, but if a transformer is incorporated the equipment can be reconnected to give a maximum output of 480 kW. In addition to ignitron rectification for the motor armatures there is thyratron rectification for the motor fields and both give variable voltage outputs under the automatic control of an electronic unit which provides smooth speed control with current limitation. The first half of the speed range is by armature voltage variation and second half by field. The firing of the ignitrons is achieved by three thyratron ignition units. From the diagram it will be seen that bridge connection is adopted to give the equivalent of 6-phase rectification

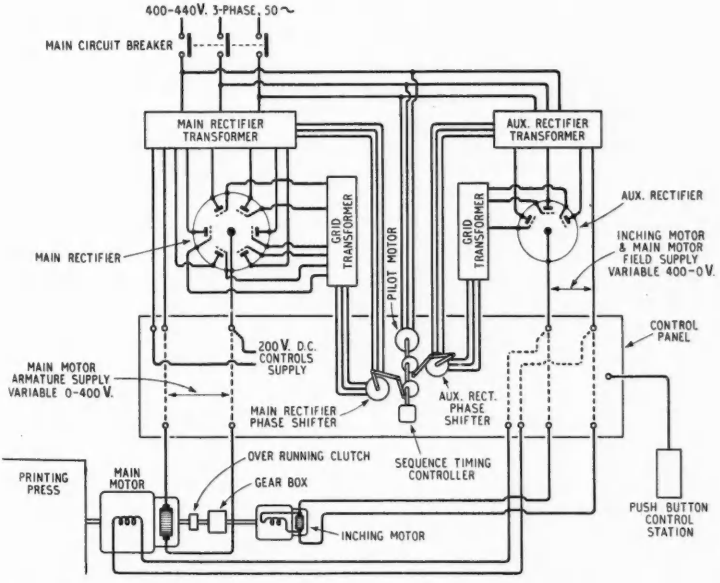


Fig. 4.—Simple circuit of d.c. drive using an induction regulator grid-controlled mercury-arc rectifier

without the use of a 3/6-phase transformer. The servo-loop and its associated error detector are also shown. Constant crawling speed at any load is assured by means of I.R. drop compensation which takes a signal from the a.c. side of ignitrons and injects it into the error detector. A stabilized voltage reference is obtained electronically from the main a.c. input, and for practical purposes is independent of supply voltage and frequency fluctuation.

The performance of this equipment using the d.c. motor was demonstrated and compared with that of the a.c. commutator motor and it became clear that it was capable of fulfilling all the necessary drive requirements.

Grid-Controlled Rectifier Schemes

The next equipment to be shown (see Fig. 3) was the magnetic amplifier grid-controlled mercury-arc rectifier with d.c. motors. This uses a 6-phase grid-controlled mercury-arc rectifier instead of ignitrons for conversion and magnetic amplifiers instead of thermionic valves for control.

In this scheme no inching motor is required and breakaway, inching and crawling are obtained by control of the rectifier firing. Variable speed between crawling and line speed and between line speed and top speed is obtained in this instance by means of push-button-operated induction type phase shifters.

Another equipment which was shown (see Fig. 4) used induction-regulated grid-controlled mercury-arc rectifiers with d.c. motors and had an inching motor and over-running clutch in place of the servo-loop control for inching and crawling. In this arrangement the armatures of the main motors are fed from one rectifier and a small rectifier supplies the inching motors and main motor fields. When, later in the sequence of operation, the inching motor has been disconnected, the voltage of this small rectifier is reduced by grid control to provide field weakening on the main motors. This type of equipment exhibits all the characteristics necessary for printing press drive, but where d.c. duplex driving equipment exists it has advantages over all the others.

The fifth and final type of drive which we saw at Hebburn consists of a combined a.c. commutator motor and a low-frequency induction motor on the same shaft and in a single housing. The 3-phase a.c. supply is taken from the control cubicle direct to the commutator motor and to a small low-frequency convertor for the induction motor. Breakaway, inching and crawling are obtained by the joint action of both sections of the combined unit, so eliminating the need for a separate inching motor and over-running clutch. This action results in the superimposing of the 3c/s motor torque characteristic on top of the 50c/s commutator motor torque characteristic. It is arranged so that the crawling speed corresponds with the synchronous speed of the 3c/s machine which, of course, has more poles than the 50c/s machine.

For speeds in excess of crawling, the low-frequency supply is disconnected and the commutator motor takes over exactly as in the conventional a.c. drive. The disconnection of the 3c/s motor is achieved by a controller driven from the press driving equipment. The fact that the reaction torque of an induction motor reverses when the motor is driven above its synchronous speed is made use of in the design of the controller, which is excited with 3c/s. This equipment was developed for an "across the press drive" with very low velocity ventilation and with a built-in hydraulic brake.

The demonstrations showed that satisfactory performance can be obtained either from straight a.c. or from a.c./d.c. schemes, so that the choice between them is one of economics. In the case of installations where existing d.c. machines are available, as in the case of supply change, there is no doubt that one of the a.c./d.c. rectification schemes should be adopted. The a.c. commutator motor, however, has the advantage of proven reliability, which is an important factor in the case of newspaper press equipment. Obviously each of the various schemes has its merits, which would make it the right choice for a particular set of circumstances.

School Lighting

Sunderland Education Committee is to spend £8,300 this year on converting seven schools in the town from gas to electric lighting. A similar sum will be spent next year to complete the conversion scheme.

AGRICULTURAL SHOWS

Electrical Aids for the Farmer

THE Royal Show being held at Oxford this week is the largest ever, occupying 150 acres. Besides overhead telephone wires, more than 10,000ft of underground cables have been laid. Crompton Parkinson, Ltd., supplied over 5,000 yd of 4-core medium voltage d.s.t.a. cable, a ring main unit and two "T.A.P." oil immersed fuse operated circuit breakers.

"Electricity Farm," which was a striking feature at the Royal Show at Shrewsbury, is again one of the principal attractions. Organized by the Electrical Development Association in collaboration with the Southern Electricity Board, the display presents the appearance of a group of farm buildings. A timber house is used as an inquiry centre, while a Dutch barn, apparently stacked with hay, houses the administrative staff. A two-storey timber barn contains an electric sack hoist, hammer mill installation, grain elevator, storage bins and a feed mixer.

In the dairy building is housed a milking parlour with an electric tandem high-level milking installation, a producer and producer-retailer dairy and farm water supply equipment — all working. The poultry building includes heater, brooders and incubators, egg cleaners, poultry pluckers and examples of special lighting for increasing egg yield.

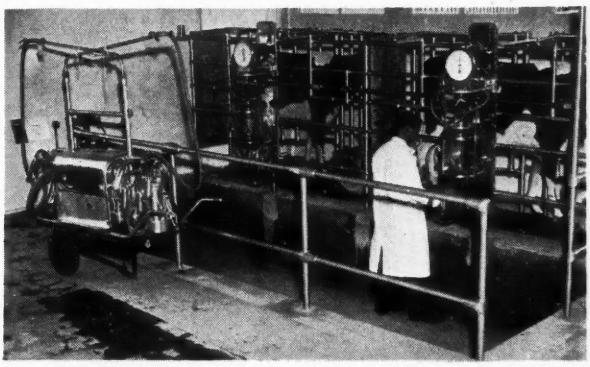
In the workshop centre demonstrations are being given of electric arc welding and a range of wood- and metal-working tools. The barn machinery section deals with the variety of electric drives available for farm machinery. Working exhibits demonstrate crop treatment and the principle of pneumatic grain conveying and elevation.

Horticultural interests are catered for by an open-air display of appliances for using electricity in greenhouse heating, soil warming, soil sterilization and bulb pasturization. A selection of domestic appliances includes water heaters, cookers, refrigerators, vacuum cleaners, washing machines, irons and kettles.

A prominent feature of the General Electric Co.'s exhibit is a display of heater batteries and aerofoil axial flow fans made by Woods of Colchester, an associated company. These units have been specially developed for grain drying in ventilated bins, in-sack grain drying and barn hay drying. Sterilizing equipment includes a 1 kW storage block sterilizing chest, a low load storage steam raiser and directly heated chests for hard water districts. A new 20-gal dairy water heater is loaded at 1 kW. Besides soil-warming equipment there is a new $\frac{1}{4}$ cu yd soil sterilizer with plate type resistance heaters. Other G.E.C. exhibits are a pig farrowing heater, a $2\frac{1}{2}$ cwt two-way hoist, lighting fittings and lamps.

Of particular interest in the "Prestcold" mobile exhibition is a churn immersion milk cooler, which performs the dual function of milk cooling and storage. For the smaller dairy farmer the "Cowley" cooler is available for use with direct-expansion type refrigerated milk coolers. Also newly introduced are a 25 cu ft service cabinet and the "Frezematic" soft ice cream counter freezer.

On the International Refrigerator Co.'s stand the "Coldrator" milk cooler equipment and a 100 cu ft cold room are of especial value to the farmer and dairyman,



A model milking display by E.D.A.

whilst the caterer, grocer and housewife are taking an interest in the ice cream storage cabinet, fish cabinet, frozen food cabinet and domestic refrigerators. Apple storage equipment is demonstrated by L. Sterne and Co., Ltd., other exhibitors of refrigeration plant being H. E. Boswell, Ltd., Frigidaire, Ltd., and J. and E. Hall, Ltd.

Further equipment for the dairy can be seen on the stand of Nathans Sales, Ltd., J. W. Woolley and Co., Ltd. ("Electrobloc") steam raiser and water heater and sterilizing plant), Vaccar, Ltd., Simplex Dairy Equipment Co., Ltd., Churn Co., Ltd., Alfa Laval, Ltd., Barford (Agricultural), Ltd., A. B. Blanch and Co., Ltd., Bland Brothers, Ltd., and Macfords, Ltd.

Simplification and standardization have been the aim of the English Electric Co.'s equipment for rural electric supplies, which includes transformer; fusegear; motors, including drip-proof types; and domestic appliances, including cookers, refrigerators, washing machines, food mixers and fires.

New Brook motors shown for the first time include the "downdraft" drip-proof motor suitable for damp surroundings on the farm, and a f.h.p grinder with tool rests. Six new automatic push-button starters are demonstrated. In addition to self-priming centrifugal pumps Auto Diesels, Ltd., show the new "X" range fully automatic diesel-engined equipment for farm, etc., lighting. Generating plant is also included in the display of F. Perkins, Ltd.

Welding demonstrations on agricultural equipment are being given by the Quasi Arc Co., Ltd., and among arc-welding equipment suitable for agricultural repair work exhibited by Philips Electrical, Ltd., are a new mobile spot welding unit and the latest portable a.c. welding transformer. The range of Philips battery chargers is also on view. C.A.V., Ltd., has a selection of electrical equipment for tractors.

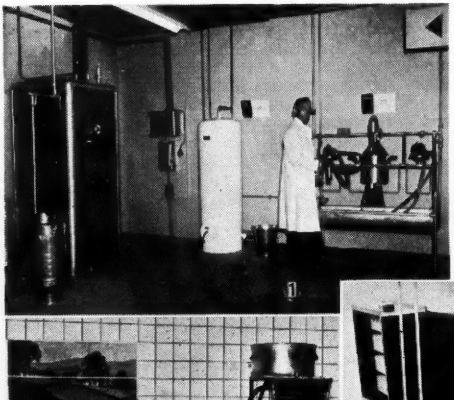
Grass driers are shown by Heenan and Froude, Ltd., and Kennedy and Kempe, Ltd., and Marconi Instruments, Ltd., are demonstrating moisture in grain and timber and portable pH meters. Manufacturers of poultry equipment are also well represented.

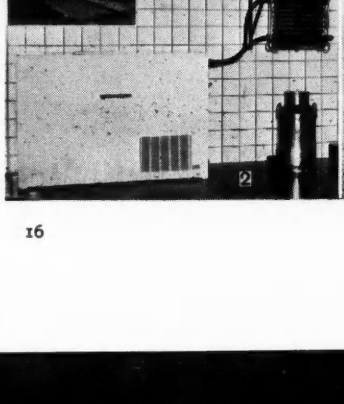
The show finishes to-day (Friday).

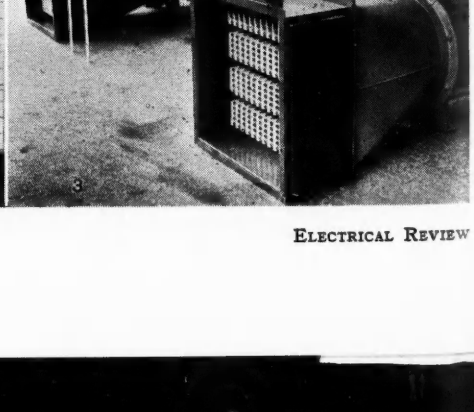
Royal Norfolk

Electricity service played an important part at the Royal Norfolk Agricultural Show, held at Anmer Park, Sandringham, on 28th and 29th June, under the presidency of the King, who, with the Queen and Princess Margaret, made extended visits to the Show on both days. The Royal Pavilion and 97 stands were provided with a supply of electricity, the actual load connected being 340 kW. This involved the laying of about 7,000 route yards of cable and the provision of a substation large enough to meet the needs of a community with a population of 2,000. The maximum demand was 175 kW.

In the reception room of the Royal Pavilion there were six enclosed unit ceiling lighting fittings surrounding







(1) Dairy equipment is demonstrated by this E.D.A. exhibit. (2) Prestcold "Cowley" milk cooler for the smaller farmer. (3) G.E.C. in-sack grain drying equipment

an extractor fan in the centre of the ceiling. The retiring rooms were fitted with three-light fittings, and plugs for electric fans, while 1½-gallon water heaters were provided over the wash-basins. The electrical installation in the Royal Pavilion and in the showground generally was carried out by the staff of the King's Lynn and Western District of the Norfolk Sub-Area of the Eastern Electricity Board.

Electrical interests were well to the fore-front among the exhibitors. The Eastern Electricity Board's marquee bearing the slogan "Electricity for Farm and Home," was one of the outstanding attractions. Inside the marquee were representative appliances for use in the dairy, the barn, the workshop, the poultry farm, in horticulture, and, of course, in the home, whilst outside were examples of electric hoists of all descriptions, milking equipment, and milk coolers and cold rooms. Demonstrations were given in the marquee throughout the day.

The importance of refrigeration on the farm is reflected in the fact that about 50 per cent of the inquiries were on this subject. There was a large electrical section in the exhibition, chiefly contributed to by retailers.

Royal Cornwall

Electrical equipment will be a feature of this year's Royal Cornwall Show, to be held at Callington, near Liskeard, which is to be visited by the King and Queen on 12th July. In addition to affording a special supply to the showground, involving the installation of a 200 kVA transformer and the erection of a mile of l.v. distribution line, the South Western Electricity Board is providing a wide range of electrical equipment for the Royal Pavilion which is being specially erected for the King and Queen's visit. To maintain a comfortable temperature in the Pavilion whatever the weather, electric fans and fires are being installed in the dining room and lounge for use as required. The Pavilion, including the all-electric kitchen where the royal party's lunch will be prepared, will be open for inspection by visitors to the Show after the King and Queen have left.

The South Western Electricity Board's own stand at the Show will include a spacious reception pavilion with an inquiry desk and four illuminated wall panels, each covering an area of approximately 40 sq ft and illustrating important aspects of the Board's activities and its service to consumers. Leading off from the reception pavilion will be two large exhibitions of electrical appliances, one dealing with agricultural equipment and the other with the latest domestic apparatus.

Magnetic Sweeper

STEEL articles such as nuts, screws and bolts dropped on aerodrome runways and taxi tracks are a potential source of damage to the tyres of aircraft and may lead to serious accidents. A simple and effective means of removing them is provided by the magnetic sweeper manufactured by the General Electric Co., Ltd., which was recently demonstrated at London Airport.

This machine comprises a four-wheel trolley on which an electro-magnet and batteries are mounted and covered by a protective casing. Propelling handles are attached to the case and on one of them is mounted a push-button switch for controlling the magnet coils. The magnet is mounted horizontally in the machine so that the gap between its pole piece and the ground can be varied up to a maximum of 2¼in.

To operate the device it is only necessary to set the magnet to the height required, switch on the supply, and push the sweeper up and down over the ground to be cleared. After sweeping, the material picked up can be dropped by switching off over a collection tray.

The total weight of the machine, including a 64 Ah 18 V lead-acid battery, is about 2 cwt.

G.E.C. magnetic sweeper in operation for cleaning runways at London Airport

VIEWS on the NEWS

By REFLECTOR

THOUGH it has been unfortunate that the heavy rain has made the Royal Show at Oxford this week not too pleasant at times, especially underfoot, it is possible that the conditions may have emphasized to the farmer the benefits of using electricity in his business. The job of keeping his buildings and equipment clean is made very much simpler if he has at his disposal an adequate supply of both cold and hot water, pumped and heated by electricity entirely automatically and without any attention whatever. He must also have thought of the numerous other ways in which electricity can immediately be brought into his service to reduce labour to give him—and his wife—more leisure, not to mention comfort and entertainment.

★ ★ ★

Nowadays aircraft are used for many commercial purposes, including electricity supply work. A note in *Electrical News and Engineering* (Toronto), however, records an application which is new to me. To speed up the stringing of a 44 kV transmission line over extremely rugged, mountainous country the Hawaiian Electric Co. experimented with the use of a helicopter. It was estimated that by conventional methods it would have taken three weeks to cut the trails and another week or so to drag the $\frac{1}{8}$in steel cable. In fact, the work was completed in several days, the helicopter taking less than an hour in actual flying time. After allowing for the hire of the machine there was an estimated saving of 60 per cent in costs.

★ ★ ★

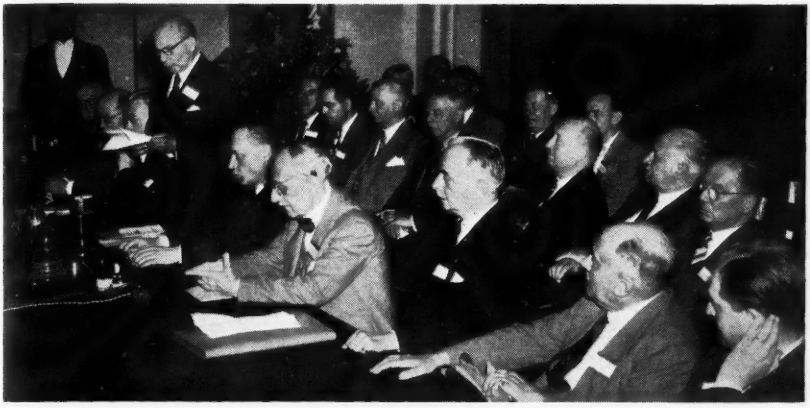
A Vancouver correspondent tells me of another unusual application—this time of soil-heating cable. A travel bureau counter of the B.C. Motor Transportation Co., made of glass to display the maps and schedules below, caused discomfort to employees selling tickets, their fingers becoming swollen and cracked from contact with the cold glass. The problem was turned over to engineers of the company who installed a soil-heating cable, laid flat on an asbestos sheet covering a false bottom in the counter. The $1\frac{1}{4}$in deep cavity was then filled with fine dry sand, which in turn was covered with a three-ply board finished with green baize cloth. The counter dimensions are 9ft by $1\frac{1}{2}$ft and the loading per sq ft 29.6 W. This device has proved so effective in increasing comfort that the company has included counter-top heating in its plans for all proposed new depots.

★ ★ ★

I wonder if any other generator has as good a record as the No. 1 alternator in the Lizard Lighthouse. This machine, according to *South Western Electricity*, was exhibited at the Paris Exhibition of 1881 and has been in operation since the following year. Now it is being superseded by a mains supply backed up by an emergency diesel plant. The light is provided by a 3 kW filament lamp with a stand-by of similar size and an emergency lamp of 500 W. A remarkable feature is the 4 ton lens, floating in a mercury bath, which is so perfectly poised that it can be moved by a slight touch of the fingers.

★ ★ ★

A story appeared in several newspapers last week about a priest who wanted a new lamp fitted into a high-up fitting. It is said that he asked the East Midlands Electricity Board to replace the lamp, which it did. There followed a bill for 2s 1d for the lamp plus 8s 6d for fixing it. The latter charge was later reduced to 2s 4d when a protest was made. The priest, rather unfairly perhaps, is reported to have said: "Nationalization means that I will have to buy a step ladder—it will be cheaper. Under private enterprise the company used to fix them free." On these terms if such renewals were at all frequent it would pay the Board to provide a step ladder.



Large Power Systems

Biennial C.I.G.R.E. Meeting in Paris

From C. O. BRETTELLE, M.I.E.E.

THE biennial meeting of the International Conference on Large Electric Systems, being held in the world's most lovely city from 29th June to 8th July, was opened by the Minister of Industry and Commerce, M. Louvel.

The president, Dr. R. A. Schmidt (Switzerland), traced the growth of C.I.G.R.E. (Conférence Internationale des Grand Réseaux Electriques) from its foundation in 1921 on the initiative of M. J. Tribot Laspière, delegate general, to its present position of having over 1,350 active members and 350 associate members (ladies) from 40 different countries. (The number of British delegates (231) slightly exceeds the total membership of 29 years ago.) Dr. Schmidt paid a tribute to the work of his predecessor, Colonel Ernest Mercier, who was president from 1934 until his recent retirement from executive office, when he was elected honorary president.

The Minister referred to the Monet five-year programme (1946) of national electrification. While there had, he said, been no systematic destruction of plant in France during the war, much of it was now obsolete. Power station output in 1948 was 48,000 million kWh, half of it hydro.

M. Giguet (Director of Equipment, Electricité de France) then showed lantern slides depicting the present stages of construction of water-power projects, the output of which will be transmitted to Paris at 220 kV. They included those at Bort (two 100,000 kW sets) and Chastang (two 85,000 kW sets) on the River Dordogne, to be visited at the end of the Conference.

On Thursday afternoon delegates (literally, in view of the heat) took off their coats to get down to the business of the Conference. The first subject was surges and lightning, the papers on which revealed many experimental activities on seemingly correct lines of approach. The

In the photograph above Dr. R. A Schmidt (president of C.I.G.R.E.) is speaking at the opening of the conference. On his left is M. Louvel, and on his right M. Tribot Laspière, delegate general

need for a common basis for measuring results was, however, emphasized and the most definite suggestions were those made by Mr. R. H. Golde (E.R.A.).

Friday was devoted mainly to questions relating to system instability and load and frequency control, in which studies of transient conditions by system analysers, and the first application of high-voltage series capacitors (in Sweden) were prominent.

Carrier-current transmission over power lines and interference with telephone and radio were considered on Saturday morning. Some divergencies of opinion were noticeable in regard to the effect of rime on attentuation at different frequencies. Results with radio communications in the 70 to 90 Mc/s band on the British grid were described by Mr. R. E. Martin (B.E.A.) and were held to offer great possibilities for overhead-line maintenance.

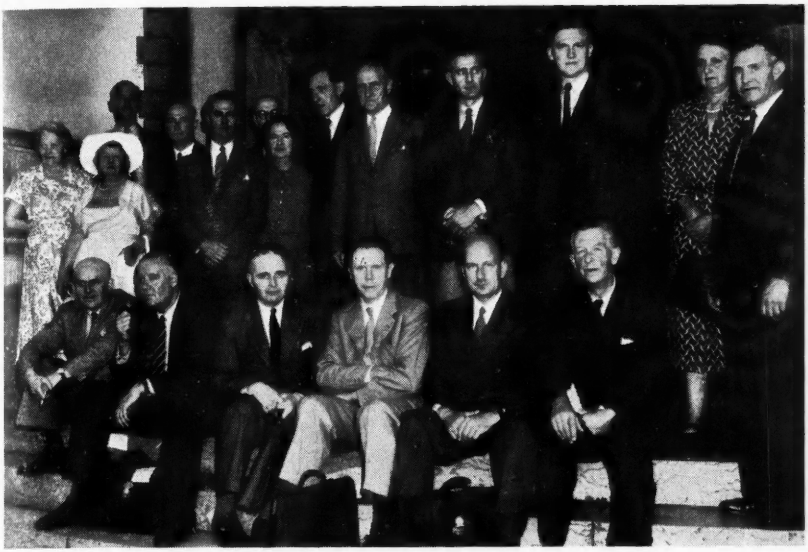
Mr. C. W. Marshall (B.E.A.), chairman of the Interferences Group, produced evidence that high-voltage power systems have caused comparatively little trouble to telecommunication systems, wired or radio, though television was more noticeably susceptible. He expressed the view that telecommunication requirements should be made less severe. Power rectifiers in special cases have seriously interfered with ripple control and have caused failure of cable dielectrics and other abnormalities in operation and Mr. E. Friedlander (G.E.C.) suggested the suppression of harmonics by installing saturated-iron-core reactors with capacitors in parallel.

Mr. E. A. Mills (London Electricity Board) reported that last December, owing to an eleventh harmonic produced by rectifiers installed for an East London railway extension, relays had failed to switch off public lamps at dawn; he strongly advocated suppression of harmonics at their source.

The advantages of standardizing time-current characteristics of relays and fuses and of using the log-log scale were stressed by Mr. W. Szwander (Belfast Corporation) in a paper on Saturday afternoon, when Messrs. F. J. Lane and W. Casson (B.E.A.) presented a comprehensive and methodical survey of protective-gear maintenance, tracing its influence on design and construction.

After the Sunday interlude, in which visits were paid to places of less specialized interest, the technical programme on Monday was allocated to discussions of a.c. transmission at very high voltages. Close agreement has been reached in regard to corona losses in relation to voltages up to 500 kV in tests at Tidd (U.S.A.), Chevilly (France), and Baden (Switzerland), which have taken into account ageing of conductors (which reduces the losses) and atmospheric conditions, which are a preponderant influence. Corona losses are found to be less than one-hundredth of the power transmitted during the year with suitable conductors. A bunch of two conductors per phase shows appreciably lower losses than a single conductor, but two conductors (or more for even higher voltages) add materially to costs of construction. Interference with other circuits at 400 kV is said to be no greater than at 220 kV.

Groups of delegates in the entrance hall of the Fondation Berthelot



British and Commonwealth delegates at the Hotel Lutetia

In this group of papers was one describing the Swedish 380 kV system (the highest voltage yet) now being constructed (see *Electrical Review*, 4th November, 1949). There was also a contribution by Dr. J. R. Mortlock (B.T.H. Co.) which described an ingenious method of using four conductors (one as automatic spare) where double-circuit reliability is required, but the power to be transmitted is below the capacity of two circuits.

High-voltage transmission came up for discussion again on Tuesday morning, but with d.c. from point to point. The difficulty of conversion from a.c. to d.c. and vice versa was regarded as not insoluble but as entailing tests over several years. A scheme to transmit 20 MW (ultimately 40 MW) at 100 kV for 62 miles from Sweden to the island of Gottland was described; it is expected to be in operation by 1955, using 50 kV convertors, and in the early stages a water return; the hydro power (transmitted by mass-impregnated cables or else polyethylene-insulated

cables without lead sheathing) is expected to cost much less than locally produced steam power.

The rest of the morning was allocated to insulation co-ordination. Experience in the United States favours developing means for keeping switching surges under control rather than providing excessive insulation, which makes lightning the dominating factor. Opinion as to the usefulness of arrestors still differs, but it is agreed that effective earthing of the neutral permits a reduction in insulation, on the assumption that the maximum voltage to earth could not exceed 80 per cent of the line voltage. In many countries the tendency is to fix the impulse insulation level at 4 Um and 50, where Um is the RMS value of normal maximum line voltage. Technical visits were arranged for the afternoon to the 220 kV interconnection substation at Issy, the central precision-testing laboratory of the electrical industry and the testing station of Electricité de France at Fontenay. The last-named is equipped with means for making direct tests on circuit-breakers in the 220 kV network, with a very-high-voltage laboratory to be completed by the end of this year and a high-voltage cable testing station. Of particular interest to British delegates is it that two out of five 200 MVA 220 kV cables now undergoing tests there are an impregnated-pressure cable of British Insulated Callender's Cables design and a gas-compression cable of the Enfield Cable Co.'s design.

A.M.E.E. ANNUAL MEETING

THE annual general meeting of the Association of Managerial Electrical Executive was held at 2, Savoy Hill, London, last week. The retiring president, Mr. C. Cameron Kirby (South Eastern Electricity Board) reviewed the negotiations which have been going on since before vesting date for the setting up of the joint negotiating machinery for the settlement of terms and conditions of service for the senior staff in the supply industry.

Mr. Cameron Kirby said it was hoped that an agreement would be signed without undue delay. It was anticipated, although nothing could be said with certainty until the agreement was signed, that the A.M.E.E. would have sole representation on the negotiating machinery for persons holding appointments in a salary range which extended to £1,500 per annum or above; below that level the Association would have representation on the negotiating machinery for senior grades in the industry jointly with the E.P.E.A. and N.A.L.G.O.

Mr. W. F. Cross, the new president, emphasized the fact that his appointment was an expression by the Association of their declared policy to represent non-engineers equally with engineers without any fear that the one might dominate the other. Mr. Cross, who is a solicitor with the Central Authority, was concerned with the formation of the Electricity Supply Senior Administrative Staff Association shortly before vesting date, and he expressed the hope that as soon as the agreement for the establishment of the machinery for the senior staff was completed, those non-engineers who had been somewhat uncertain as to which body they should join to secure representation would, where they held an appropriate appointment, join the A.M.E.E. The effectiveness of the staff side in these negotiations on terms and conditions of service depended on the degree of support that would be forthcoming from the officials concerned, to many of whom the conception of joint negotiating machinery for senior staff was something new.

A presentation was made to Mr. F. W. Purse on giving up his work as assistant secretary, which he has carried out in an honorary capacity for the last two years. Mr. Purse is giving up the secretarial side of his work with the A.M.E.E. for personal reasons, but has agreed to continue as a trustee for the time being.

Electronics Symposium

IT is announced that the Electronics Section of the Scientific Instrument Manufacturers' Association (S.I.M.A.) is to hold its annual exhibition and symposium at the Examination Hall, Queen Square, London, W.C.1, from 5th to 8th September.

As in previous years, a series of technical papers will be read by scientists and engineers specializing in various branches of the electronic art. There will also be a comprehensive display of the latest types of British scientific and electronic instruments. Entrance to the symposium itself will be by ticket (covering the exhibition also), obtainable from the Secretary of the S.I.M.A., 17, Princes Gate, London, S.W.7. For visiting the exhibition alone presentation of a trade card is sufficient.

Commerce and Industry

I.E.C. Committee Meetings
Paterson Award Appeal

MEETINGS of the Committee of Action and of several Technical Advisory Committees of the International Electrotechnical Commission are being held in Paris from 10th to 22nd July. The United Kingdom will be represented by fifty delegates appointed by the British Standards Institution, the Electrical Industry Standards Committee of which is the British National Committee of the I.E.C.

The following Technical Advisory Committees will be holding meetings: No. 3—Graphical Symbols; No. 7—Aluminium; No. 12—Radio-Communication; No. 17—Switchgear; No. 23—Electrical Accessories; No. 24—Electric and Magnetic Magnitudes and Units; No. 25—Letter Symbols and Signs; No. 32—Fuses; No. 33—Capacitors for Power Systems; No. 34—Lamps, Lamp Caps and Holders; and No. 35—Dry-cell Batteries.

There will also be a meeting of the Special International Committee on Radio Interference (C.I.S.P.R.).

It had originally been arranged that a meeting of the Technical Advisory Committee on Steam Turbines should also be held in Paris, but as many of the members of that Committee will be attending the meeting of the World Power Conference in London next week, the Steam Turbines meeting is taking place in London on 6th and 7th July.

New Bakelite Laboratories

A few days ago representatives of the Press were invited when a party of distinguished visitors inspected the recently opened research and development laboratories of Bakelite, Ltd., at Tyseley, Birmingham. These laboratories cover a floor area of more than 35,000 sq ft and are divided into two main sections, research and development.

The company's interest in plastics now extends over a much wider field than the phenolics of the original Baekeland patents in 1907. Urea, melamine, vinyl, styrene, silicone and other plastics as well as phenolics are therefore included in the investigations of the research department, together with inquiries of a fundamental nature into the molecular structure of plastics.

The work of the development department consists of applied research. It is responsible for the development to a manufacturing scale of all new products and of finding new applications for existing products. This necessitates continual co-operation with the industries concerned and in tackling the practical problems of applied science in fields ranging from atomic energy, radar and telecommunications to colliery engineering.

West Indies Cricketer at Crompton's

Mr H. Johnson, the West Indies fast bowler, who is at present in this country with the West Indies cricket team, is one of the leading electrical contractors in Jamaica, with a business in Kingston, B.W.I., trading under the name of the Three "H" Electrical Co. Temporarily unable to play cricket because of a strained side, he has been visiting British electrical manufacturers. In the accompanying picture he is seen at the London showroom of Crompton Parkinson, Ltd., where he saw

Mr. H. Johnson, the West Indies cricketer, at the London showroom of Crompton Parkinson Ltd. With him is Mr. B. Courtney Laws, of the company's overseas division

Members of the Institution of Mechanical Engineers with guides in the new heavy plant factory of the British Thomson Houston Co., Ltd.

some of the latest developments in lamps, fluorescent tubes, lighting equipment and motors.

Transformers for Rhodesia

Two large transformers left the Bushbury Engineering Works of the Electric Construction Co., Ltd., recently for Birkenhead for shipment by s.s. *Empire Byng* to the port of Durban for Salisbury Municipality. The transformers, which are for outdoor service, have a capacity of 4,000 kVA stepping up from 11 kV to 33 kV, and weigh about 17 tons each. They were ordered by Ash Brothers of Johannesburg.

Lead Price Further Reduced

A further reduction of £4 per ton to £88 was announced on 29th June by the Ministry of Supply. This follows a reduction of £4 per ton made on 24th June.

Works Visit

On 23rd June, as part of the Summer Meeting at Birmingham, 150 members of the Institution of Mechanical Engineers visited the main works of the British Thomson-Houston Co., Ltd., at Rugby. The party toured some of the factories devoted to the manufacture of heavy plant, whilst the ladies saw the lamp factory. The visitors were entertained to lunch at Coton House, and were welcomed by Mr. W. W. Vinsen, director of manufacture.

At tea, Mr. Vinsen gave some particulars of the largest turbine factory in the world which he saw recently when in America. In full operation, this new American plant had a capacity for producing each month sufficient turbo-alternators to supply power and light for a city the size of Birmingham—such was the kind of world competition we could expect in the future. Since the war, B.T.H., like many other companies, has increased its manufacturing capacity both in buildings and plant, and in the course of the tour of the works which included turbine factory, gear factory, the new heavy plant building, and fabrication factory, the visitors saw something of the recent additions and extensions to the Rugby Works.

Exide Convention

Tribute was paid to Exide service agents by Mr. A. W. Browne, chairman of Chloride Batteries, Ltd., in the course of the annual banquet, held during a recent Exide Service Agents' Convention at Bournemouth. He said that the company had made further progress during the past year in contacts abroad and to-day it had strong associations in every civilized country

Mr. H. V. Schofield, sales director, Chloride Batteries, Ltd., introduces the Mayor of Bournemouth at the Exide Convention

in the world. Responding for the 700 service agents and their guests, Councillor Mrs. M. E. Walters said that in these days of nationalization and regimentation the company had provided a course in humanization. Among the guests at the banquet, ball and cabaret were the Mayor and Mayoress of Bournemouth, Councillor and Mrs. S. A. Thomson.

At the three business sessions of the Convention under the chairmanship of Mr. C. J. B. Barlow (Warrington Electrical Co., Ltd.), many of the agents' problems were discussed. In addition to the banquet, there was a full programme of social and sporting activities including golf competitions, a steamer trip at the invitation of the Mayor and Corporation, lunches, dinners and dances. The final address to the Convention was delivered by Mr. H. V. Schofield, sales director and chairman of the Convention. He emphasized the value of ploughing back profits, a policy that would prove very valuable in bad times should they arise later.

Fire Brigade Wireless

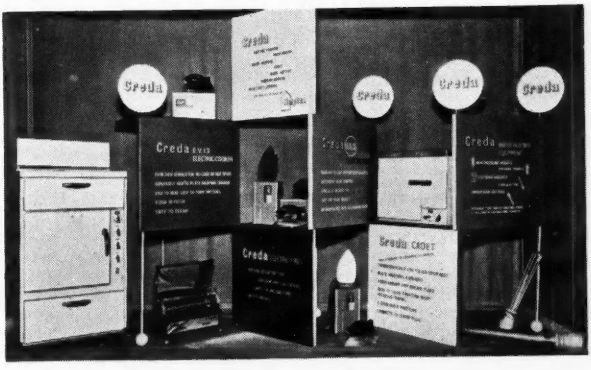
The Fire Brigades Committee of Middlesex County Council has recommended the Council to approve expenditure of £15,000 on providing wireless-telephony equipment for the Fire Service.

Institute of Physics

The summer meeting of the Industrial Radiology Group of the Institute of Physics will be held at the New Horticultural Hall, Victoria, London, from 25th to 28th July. Admission to the lectures and Group Summer Exhibition (and to the Technical Exhibition of the International Congress of Radiology) will be by ticket only obtainable free from the Institute of Physics, 47, Belgrave Square, London, S.W.1, from which details of the lectures are also obtainable.

"Creda" Travelling Displays

The accompanying picture shows the 1950 "Creda" travelling display of the Simplex Electric Co., Ltd., seventy of which are now touring the country. These multi-coloured double-sided displays are made up in units which are easily assembled and dismantled. Many different combinations can be worked to fit in with the stock of products held in any particular showroom.



The 1950 "Creda" travelling display, seventy of which are at present on tour

Contract Price Adjustment Formulae

The following are the latest figures for use in the B.E.A.M.A. contract price adjustment formulae. The rate of pay for adult male labour at 10th June is deemed to be 115s (unchanged). Cost of materials: the Board of Trade index figure for intermediate products as on 10th June is 282.6, and is the figure for May (against 277.9).

Motor Reference Book

We have received from Higgs Motors, Ltd., Witton, Birmingham, 8, a copy of the third edition of its pocket reference book entitled "Industrial Electric Motors." This 128-page booklet is priced at 1s 6d and apart from illustrating and describing the manufacture of electric motors it contains a great deal of information and diagrams of value to those who are concerned with the installation and maintenance of electric motors and generators.

Board's Appeal

In the Edinburgh Court of Session on 29th June judgment was reserved in an appeal by the South West Scotland Electricity Board against the judgment of Lord Birnam, on 8th April, awarding £52,408 to Mr. James Paterson, former general manager and director of the Clyde Valley Electrical Power Co., in respect of loss of salary and pension rights.

Mr. A. Thomson, for the Board, said that

the facts were not in dispute. It was contended, however, that the sum awarded had been based on an erroneous calculation. The sum due to Mr. Paterson, it was claimed, should be £34,782; it should be based not upon a salary of £6,000, the remuneration he was receiving before the termination of his service, but upon a salary of £4,500 and upon a pension figure of £2,250 instead of £3,000.

For respondent it was submitted that as a result of the taking over of the company he was £6,000 a year out of pocket. The agreement stipulated a minimum salary of £4,500 and in terms contemplating that the salary would be increased.

Industrial Load Spreading

On Monday, in a written Parliamentary answer, Mr. George Isaacs, Minister of Labour, indicated the arrangements for industrial load spreading next winter. He said that the expansion in generating capacity was now beginning to overtake the increase in demand, but it was estimated that there would still be a deficit during the peak periods next winter. The position was so improved regarding midday as to warrant confining the morning peak period to 8-9.30, though care would still be necessary up to noon. During December, January and February a load reduction from industry of at least 10 per cent was recommended from 8 to 9.30 a.m., with a similar reduction from 4 to 5.30 p.m. between December and mid-January.

Industrial Supervisors

At a recent meeting of local foremen held in the Rotherham College of Technology, under the chairmanship of Mr. C. L. Old, principal of the College, it was decided to form a Rotherham Section of the Institute of Industrial Supervisors. Officers and a provisional committee were elected. The acting chairman of the Section is Mr. F. Harper, chairman of the Foremen's Association at Steel, Peech & Tozer, Ltd., and Mr. P. G. Hibbard, 31, High Gate, Tinsley, Sheffield, has been elected acting hon. secretary.

Internal Combustion Engine Production

The Productivity Team from the British internal combustion engine industry which visited the United States in October and November last has now issued its report on its visit in which it reviews the causes of high productivity in the United States, questions of management and labour, production methods, trends of design and costing, and gives its recommendations. The report is published by the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1, at 2s 6d.

Factors' Amalgamation

The companies of Mosers, Ltd., and Nettlefold & Sons, Ltd., which have for some years been under the control of the same management, have now been amalgamated under the title of Nettlefold & Moser, Ltd. Nettlefold & Sons, Ltd., have ceased trading and the business has been transferred to Nettlefold & Moser, Ltd., at 170-194, Borough High Street, London, S.E.1.

Batti-Wallahs' Society

Sir Henry Self, deputy chairman of the British Electricity Authority, was in excellent form when he addressed the Batti-Wallahs' Society at its monthly luncheon last week. Sir Henry spoke on "The Seven Stages of Science," and his amusing talk revealed a deep study of the works of the early philosophers and scientists. Mr. H. Nimmo, president of the Society, was in the chair, and among those present we noticed Sir John Hacking, Mr. J. N. Waite and Mr. V. A. Pask.

Window Display Contest

Results of the 1950 Hoover spring window display contest have been announced. The best Hoover cleaner display in all Britain has been adjudged that of Selfridges, Ltd., London, who thus gain the national cup and a cash award of 100 guineas. Staged during the spring cleaning season, competition in this Hoover contest was in three retailer groups—(1) Electricity Board showrooms, (2) department stores and furnishers, (3) electrical contractors and ironmongers, organized on a national basis and also as regional contests throughout the country. A record entry competed for thirty-nine cash award groups from 50 guineas downwards. The winner of the first prize in group 1 was the North Western Electricity Board, Clarendon Place, Hyde, Ches.; in group 2 (and the national championship cup), Selfridges, Ltd.; and in group 3, Moulds, Ltd., Leatherhead.

B.E.A. Executives at Hopkinsons

On 26th June, at the invitation of Hopkinsons, Ltd., a party, including senior executives of the British Electricity Authority, made a short tour of the company's works at Huddersfield. The party comprised Lord Citrine (chairman, B.E.A.), Sir John Hacking (deputy chairman (operation)), Dame Caroline Haslett, Lt.-Col. E. H. E. Woodward, Mr. V. A. Pask (chief

ngineer) and Messrs. H. F. Carpenter, L. J. Luffingham, G. A. Vowles (controller, Yorkshire Division), W. H. Dunkley, P. G. Hieatt, C. G. Richards and J. Shillito. The visitors were met by the chairman and managing director of the company, Mr. E. L. Brown, and were conducted round the works. Particular interest was displayed in the large numbers of high-pressure valves under construction for B.E.A. generating stations and for many large power stations overseas. At the conclusion of the tour, the visitors were entertained to tea.

Trade Announcements

Mr. R. W. Palmer has been appointed representative covering the county of Kent and certain S.E. London postal districts, for **Ekco-Ensign, Ltd.** He will operate from the company's London office at 5, Vigo Street, W.1.

Ulster Agencies, Ltd., 12-14, Gt. George's Street, Belfast, have been appointed distributors of Tilling-Stevens electric motors for Northern Ireland.

Federation of Wholesale Organizations

The Federation of Wholesale Organizations was formally constituted at a meeting held at the London Chamber of Commerce on 29th June. The following office bearers were elected: Hon. president, Mr. W. A. Cooke (Wholesale Textile Association); hon. vice-president, Mr. C. H. G. Hobday (Radio Wholesalers' Federation and Motor Factors' Association); hon. treasurer, Mr. C. Horton (Radio Wholesalers' Federation and Motor Factors' Association); secretary, Mr. W. T. Caves (Wholesale Textile Association). The F.W.O. replaces the Joint Standing Committee on Wholesale Textile Distribution, an interim body set up to pave the way for the founding of the permanent organization. One of its functions will be to bring about a better appreciation of the functions of the wholesaler, and Mr. F. Murray Milne, the public relations officer of the Wholesale Textile Association, has agreed to advise it. The address of the F.W.O. is 75, Cannon Street, London, E.C.4.

Copper Prices

The Ministry of Supply announces that discussions have been held with the Rhodesian producers on the future price basis for purchases of Rhodesian copper, following the re-imposition with effect from 1st July of the American import duty. The Rhodesian producers have stated that they do not wish to take advantage, in their pricing arrangements with the Ministry of Supply, of any increase in the American domestic price due to the imposition of the duty. For the time being the first 2 cents of any increase in the United States domestic price as at June 30 will not be reflected in the Ministry of Supply selling price. Further discussions will take place as soon as an assessment can be made of the effect which the duty has had on American prices.

International Television

The Postmaster-General, Mr. Ness Edwards, presided last week at a meeting in London between representatives of the Post Office, the B.B.C. and the Radio Industry Council to discuss the Council's proposals for interchanging television programmes with France. After a full and frank discussion Mr. Ness Edwards promised that the proposal should receive early consideration.

Lifts for South Africa

Twenty new Express lifts are to be installed in Cape Town, Durban, Pietermaritzburg, Port Elizabeth and Johannesburg. Among these the Grand Hotel, Cape Town, is to have three gearless passenger lifts operating at a speed of 500 ft/min and a further single passenger lift and four service lifts. These are being supplied by the Express Lift Co., Ltd., Northampton, an associated company of the General Electric Co., Ltd.

Change of Address

The Association of Electrical Machinery Traders has removed to 100, Park Street, Grosvenor Square, London, W.1 (telephone: Grosvenor 5416).

Catalogues and Lists

Benjamin Electric, Ltd., Brantwood Road, London, N.17.—Catalogue and price list of fluorescent lighting fittings and associated accessories.

Falk, Stadelmann & Co., Ltd., 91, Farringdon Road, London, E.C.1.—Priced catalogue of glassware for electric lighting purposes.

Austin Walters & Son, Ltd., Ayres Road, Old Trafford, Manchester, 16.—Priced folder on "Auswalite" cold cathode lighting fittings.

Chilton Electric Products, Ltd., Hungerford, Berks.—Four leaflets on "Atlas" H.R.C. miniature circuit-breakers.

Radiovisor Parent, Ltd., 1, Stanhope Street, London, N.W.1.—Range of leaflets describing photoelectric and electronic equipment.

Sun Electrical Co., Ltd., 118-124, Charing Cross Road, London, W.C.2.—Priced catalogue of desk, bracket and ceiling fans.

COAL INDUSTRY MODERNIZATION

N.C.B.'s Plans for Increasing Production

THE lines along which the National Coal Board aims to raise the technical standards in the industry are reviewed in a chapter of the Board's annual report for 1949 published last week (H.M. Stationery Office, 7s net). After dealing with the various types of mechanical cutting and conveying equipment and underground transport the report discusses electrification policy.

At present just under half of the power for collieries is obtained from the direct use of steam. With the introduction of more machinery the electric power demand (at present 940,000 kW, of which about half is met by the British Electricity Authority) is rising and is likely to be in the neighbourhood of 1,300,000 kW by 1955. In view of the importance of this aspect a national policy for the supply of electric power to collieries has been in course of formulation, in which the Board has been guided by the need for making the best use of low-grade coals (at present good-quality coal has often to be burned).

Colliery Power Stations

It is aimed to replace all uneconomical steam-raising and generating plant and build colliery power stations capable of consuming efficiently all the low-grade coal produced. The power stations would be built in units of standard size, much smaller than those of the B.E.A., and consequently there would be no difficulty in obtaining enough "make-up" water. It is recognized that transmission and stand-by plant must be provided economically; in some instances this may be possible with the Board's own equipment, and in others it hopes to arrange for the B.E.A. to meet deficiencies and absorb surpluses. It may also sometimes be more economical to take supplies direct from the Authority, with which the various questions referred to were under discussion during the past year.

Standardization of equipment and stores is being proceeded with in the interests of economy and efficiency. Mention is made of the preparation of standard specifications for a.c. winders and the proposed reduction in the types of miners' lamp bulbs from the present 42 to 15.

Lighting is an important preoccupation of the Board. Experiments have been continued with fluorescent lighting at the coalface, this form of illumination being provided at two more collieries (Easton in the Scottish Division and Elsecar in the North Eastern Division). Two earlier installations were withdrawn because of unsuitable conditions. To the six experimental installations in use at the end of the year three others have been planned for the present year. One will not be confined to a single face but will light all the coalfaces in an underground district. As experience of the system is gained the equipment is being modified and developed. Experiments in the lighting of coal-picking belts in cleaning plants indicated that the efficiency increased until 10 ft candles was reached, after which the improvement was much less marked. However, to ensure adequate lighting an illumination of 20 ft candles is being provided on all picking belts. Other experiments are being made with lighting in various colours.

Coal Cleaning

On the subject of coal cleaning, the report states that since nationalization 38 new plants have been brought into operation at a cost of £2¼ million, and capable of cleaning about 7¼ million tons a year. By December a further 27 plants were under construction; these will clean some 9½ million tons annually. Compared with the average capacity of 81 tons an hour before 1947, some of the new plants have a capacity of 600-800 tons an hour. For cleaning fine coal, much of which was formerly discarded as waste from the washeries, four froth flotation units were put into operation last year. Since the Board adjusted the prices of all coals, reducing those of lower qualities, far fewer complaints have been received, and it is considered that, by and large, industry is now getting the kind of coal it needs.

Financially, the Board made a net profit last year of £9,500,000, reducing the deficit carried forward to £12,300,000. It is pointed out, however, that this profit was made possible only because of the favourable world price of coal; if all the coal had been sold at the prices charged at home the industry would not have covered its outgoings in 1949. Output of the mines increased by 5 million tons to 202.7 million (apart from 12.4 million tons from opencast sites) although there were 17,400 fewer men in the industry than at the beginning of 1949. Output per manshift for all workers (about 23 cwt) was more than in 1938. For the first time since the war, costs per ton were reduced (by about 6d).

Rationalized M.K.S. Units

Outcome of Discussions before the I.E.E.

By LAURENCE H. A. CARR, M.Sc.Tech.,M.I.E.E.*

THE meetings recently held by the Institution of Electrical Engineers in London and Manchester to discuss the symposium of papers on the M.K.S. system of electrical units[1] have conclusively demonstrated the complete acceptance by the electrical engineering profession of the principle that the rationalized M.K.S. system should in future be the only system of units used in electrical engineering, whether for teaching purposes or for the presentation of papers on electrical science.

The opinions expressed at these meetings were practically unanimous. The many university representatives who spoke were emphatic in its favour, several having already (though recently) adopted it for use throughout their electrical courses. Similar support was gained from technical college teachers at Higher National Certificate level.

University View Supported

Representative engineers from industry, speaking at Manchester, supported the university view, stating that while many electrical engineers in industry would no doubt continue to use in their routine work any system of units that was found to be convenient for the immediate purpose, there appeared to be not the slightest difficulty in accepting the rationalized M.K.S. system (instead of the unrationalized C.G.S. system as hitherto) as the fundamental scientific system for use when reference to first principles was desirable.

In London (but not in Manchester) a little hesitation was expressed as to whether the use of a rationalized system of units would not increase the difficulties of students being introduced to fundamental electrical theory for the first time.

On the other hand, speakers with experience of teaching the rationalized system to young students held that, in fact, it had proved to be simpler to their understanding than the unrationalized method.

By and large, the general opinion was that students should commence, in the secondary schools no less than in first-year technical school and college courses, with the same system as they would be required to use throughout their career, namely, the rationalized M.K.S. system.

It was also noted during the discussions that reference to the M.K.S. system by the alternative title of "Giorgi system" (as suggested by the International Electrotechnical Commission in 1935) was scrupulously avoided and it would appear that this term has proved to be unacceptable in this country.

It is, in fact, a matter of history that the first suggestion to use a rationalized system of units, on the present lines as regards the forms of the equations, though based on C.G.S. units, was made by Professor John Perry in 1891[2] while the complete rationalized M.K.S. system exactly as adopted today, including the name "newton" for the unit of force, was put forward by Professor David Robertson of Bristol so long ago as 1904.[3]

Reasons for Adoption

For the benefit of the older generation of engineers brought up on unrationalized fundamental equations some attempt may be made to indicate the reasons for the adoption of the new point of view. Although the pros and cons of the rationalized and unrationalized systems were outlined in the papers published in the symposium, the reason for the adoption of the rationalized system appears to lie deeper than a mere choice based on convenience.

According to the present view the rationalized system of units is the natural

* Chairman, B.E.A.M.A. Standards Committee; Consultant, Metropolitan-Vickers Electrical Co., Ltd.

and necessary consequence of the most logical method of approach to fundamental electrostatic and electromagnetic phenomena. In Victorian times the most widely known form of the inverse square law was Newton's law of gravitation, depicted by two massy bodies connected by a tube of ether which carried the gravitational force between them. The fundamental concept was, therefore, that of a straight line with a body at each end. This concept leads naturally to unrationalized equations, and when electric charges and magnetic poles were found to follow similar types of inverse square laws, the same type of unrationalized fundamental formulæ were adopted.

The modern approach is to base fundamental theory on the electric field which exists between two plates, one or both of which carry electric charges, and on the magnetic field which exists between two surfaces of different magnetic potential. These concepts (and there are others which give the same result) yield rationalized basic equations.

The decision to prescribe the use of the rationalized M.K.S. system for all electrical engineering teaching and literature is one of the most important advances towards the furtherance of electrical engineering science that has taken place in the past few generations. The advantages of the employment of but a single system of units in place of the half-dozen hitherto in use marks a great step forward, even though the consequence necessarily follows that all text books not conforming to that system will at once become out of date.

The immediate problem is to ensure that all teachers, all writers and revisers of text books and all writers of Institution and similar papers conform to this practice. Senior students, as well as older men, will still need to be informed on the now obsolete systems of units, in order that the literature of the past shall not be closed to them, but this fact has no bearing on the necessity for the immediate introduction of the rationalized M.K.S. system into all new works.

REFERENCES.

[1] *Electrical Review*, 24th March and 7th April, 1950.

[2] *Electrician*, 31st July, 1891.

[3] *Electrician*, 22nd April and 27th May, 1904.

Sweden's Overseas Trade

THE value of Swedish electrical exports continued to increase last year when the total was up by about 15 per cent on 1948. As a whole the country's exports were in excess of imports of such goods which decreased by about 40 per cent. The values of the leading items, with notes of increases or decreases, are shown in the accompanying tables. The advance in shipments of telegraph and telephone apparatus, accumulators and vacuum cleaners was marked. There were no increased imports worth mentioning, and those of cable and wire and power plant were very much less. At the same time Sweden is still a net importer of cable and of the starting, regulating, control and switch apparatus group. [£1 = 14.50 Swedish Kr.]

IMPORTS

Class of Equipment	1949 Kr. (000)	Inc. or dec. on 1948 Kr. (000)
Generators, motors, convertors, etc.	26,830	– 8,630
Vacuum cleaners, fans, etc.	7,745	– 4,545
Stators, rotors, current collectors, etc.	3,250	– 195
Accumulators	1,350	– 340
Lamps, metal filament	4,790	+ 300
Lamps, mercury vapour, etc.	3,920	– 420
Carbons for electro-tech. purposes	7,200	+ 25
Starting, regulating, control and switch apparatus	12,307	– 373
Porcelain insulators	4,850	+ 1,380
Cable, metalclad	13,550	– 23,120
„ other	8,720	– 5,790
Electric stoves	670	– 145
Radio apparatus	19,030	– 2,550
Electro-medical, etc., apparatus	21,095	+ 305

EXPORTS

Class of Equipment	1949 Kr. (000)	Inc. or dec. on 1948 Kr. (000)
Generators, motors, convertors, etc.	27,880	– 1,210
Vacuum cleaners, fans, etc.	19,350	+ 2,990
Accumulators	17,045	+ 4,690
Lamps	2,415	+ 1,245
Starting, regulating, control and switch apparatus	10,090	+ 1,190
Cable, metalclad	3,820	+ 1,510
Telegraph and telephone apparatus	45,300	+ 7,115
Radio apparatus and valves	8,220	– 1,800
Electro-medical, etc., apparatus	3,410	+ 30
Special electrical apparatus, unspecified	25,110	+ 8,185

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Mr. Charles I. Orr-Ewing asked the Postmaster-General what support he was giving to the plan to link the French and British television systems.

Mr. Ness Edwards said he was fully in sympathy with the idea of exchanging television programmes with other European countries and he had had a full discussion with representatives of the Radio Industry Council. The practical aspects of any plan would require detailed examination by all authorities concerned and he could not commit himself as to the outcome.

Asked by Dr. Broughton what would be the range from the Holme Moss broadcasting station within which there would be good reception of television, Mr. Ness Edwards said that the B.B.C. expected that, broadly speaking, the service area of this station would extend from the east coast to the west coast. To the south it would include Birkenhead, Stoke-on-Trent, Retford and Grimsby, and to the north it would include Barrow-in-Furness, Morecambe, Ripon and Bridlington. Near the boundaries of this area reception would depend on local conditions.

In reply to Mr. D. Thomas, the Postmaster-General said that the proposed television transmitter to serve the Bristol Channel area would be at St. Nicholas, Glamorgan, provided that the B.B.C. was able to acquire the site for which it was now negotiating. He informed Mrs. Jean Mann that work on both the television station at Kirk o' Shotts and the communication link was being pressed on as rapidly as possible; provided no unforeseen delays occurred it was hoped that this high-power station would be open by about the end of 1951.

Compensation Payments

Mr. Black asked the Minister of Fuel and Power whether he could now state when he would publish the regulations governing the payment to local authorities who were formerly electricity undertakers of the amounts they were to receive as compensation for loss on severance.

Mr. Noel-Baker said that he hoped they would be published within a few weeks.

Overhead Line Poles

The Minister of Fuel and Power, Mr. Noel-Baker, informed Mr. John Morrison that no allotment of steel was made in 1949 for steel poles to carry overhead electricity conductors, but some 600 tons of steel were allocated in that year for the manufacture of reinforced concrete poles for that purpose. The size of the allocation was largely due to the shortage of both home-grown and imported wooden poles during the first part of that year.

Scottish Schemes

Lord Malcolm Douglas-Hamilton asked the Secretary of State for Scotland how much power from the North of Scotland Hydro-Electric Board's schemes had been used for industry in the seven crofter counties.

Mr. McNeil said that the Board at present supplied industrial consumers in the seven crofter counties at the rate of 12 million kWh annually.

Capital Reductions

Mr. Donner asked the Minister of Fuel and Power by what amount reductions had been made in the capital available to the electricity supply industry in the current financial year; and what percentage this cut constituted.

The Minister said that an investment programme was approved for the calendar year. The amount originally sanctioned for electricity supply in 1950 was £113,000,000, but after devaluation it was decided to reduce the rate of expenditure to £102,000,000 a year. As this reduction could not be made immediately effective, he regretted that it was not yet possible to say what the actual saving in 1950 might turn out to be.

Atomic Energy

Mr. Hector Hughes asked the Minister of Supply what progress had been made in British national research stations with the problem of harnessing atomic energy for industries, travel and other peaceful development purposes; and when it was likely to be available for use for such purposes.

Mr. George Strauss replied that during the last four years considerable progress had been made in preliminary planning of nuclear reactors for use as power units. New high-voltage machines and other facilities required for investigating components and materials which might be used

in such reactors had been completed at Harwell and were being used to determine whether the various systems which had been planned were practicable. A programme for the construction of the first experimental power reactors was now being prepared. Until some experience had been gained in the operation of such reactors it would be premature to estimate their prospects. Deliveries of radioactive isotopes from Harwell for medical, scientific and industrial use were meeting all home and export demands.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

I.E.E. Papers

I HAVE just opened my *Journal* of the Institution of Electrical Engineers for June. Of four forthcoming papers announced, I cannot even understand the titles of three. In a list of ten nominations for the officers and Council (all excellent men, no doubt) one name represents the manufacture of industrial electrical plant and the rest are all either scientists, professors, or officials of Government Departments.

Something seems to have got out of balance. Thirty years ago an electrical engineer of average intelligence could claim to have a broad knowledge of how practically all electrical plant worked. Now the great aim seems to be to make everything so frightfully clever that no one but its father can understand it, or even recognize what it is for. We fly automatically to electronics for something that could probably be done quite well enough by a simple rheostat or a spring.

Before any back-room boy is allowed to design anything, he ought to be made to serve for a year as electrician in a factory, with all the wiring diagrams and instruction books destroyed!

Significantly enough, the title of the one paper I think I might understand is "Standardization and Simplification in the Electrical Industry."

Robertsbridge. T. J. BARFIELD.

British Codes of Practice

AN excellently instructive article on the preparation of the British Codes of Practice was contributed by Mr. G. E. Moore to the *Electrical Review* of 2nd December, 1949.

As an overseas observer, after twenty-five years' association with the consumers' side of the British electricity supply industry, one may scarcely avoid developing a critical outlook in which the subject strikes a significant note.

In South Africa it is not always appreciated, and perhaps less readily admitted, that Britain, as well as leading the world in social reform, has also considerable scope in influence towards good practice. This is even more essential in these younger countries where necessity is not so often the mother of invention as of adaptability in using the nearest article which may be available, even if less suitable than others which are not readily to hand, or perhaps their existence is unknown.

In this light the educational value of these Codes, directly or indirectly, can scarcely be overstressed and the plea for a wide circulation at low cost would surely be of first-class advertisement value to British enterprise abroad.

That the pedantic inclination of the draft specifications should have given place to workaday language in the Codes must be welcome to an increasing circle, including those whose work we should like to see once more emulate the reputation of earlier craftsmen.

Colenso, Natal, South Africa. V. S. LAKE.

Industrial Art Bursaries.—The Council of the Royal Society of Arts is again organizing an industrial arts bursary competition which will be divided into nine sections, two of which are domestic electrical appliances and electric lighting fittings. Particulars and entry forms can be obtained from the secretary of the Royal Society of Arts, John Adam Street, Adelphi, W.C.2.

ELECTRICITY SUPPLY

Contracts for Power Station Equipment

First Section of 275 kV Network

DURING the past month the British Electricity Authority has placed contracts for power station, switching and transforming station and transmission equipment amounting in the aggregate to £3,187,217. The principal contracts include the following:—

Barking "C" power station, superstructures for main buildings; and Woolwich power station, circulating water river works.—Sir Robert McAlpine & Sons, Ltd. North Tees power station, coal and ash handling quays.—Sir Robert McAlpine & Sons (Newcastle-upon-Tyne), Ltd. Doncaster power station, structural steelwork.—Wright, Anderson & Co., Ltd. Northampton power station, cooling tower. — Film Cooling Towers (1925), Ltd. Littlebrook "C," low-pressure pipework.—Brightside Foundry & Engineering Co., Ltd. Connah's Quay, pile foundations. — Yorkshire Hennibique Contracting Co., Ltd. Portobello, main and auxiliary cables.—British Insulated Callender's Cables, Ltd. Goldington (Bedford), access roads, railway bridge and sidings and preliminary works.—Taylor Woodrow Construction, Ltd. Plymouth "B," administration and auxiliary buildings.—John Laing & Son, Ltd. Carrington power station (near Manchester), 3.3 kV and 415 V switchgear; and Brimsdown substation, 132 kV 90 MVA reactors.—English Electric Co., Ltd. Islington substation, site and foundation works. — Holloway Brothers (London), Ltd. Worthing substation, 30 MVA 132/33 kV transformers and earthing transformers.—Johnson and Phillips, Ltd.

Power Station Extensions

The B.E.A. has now received the consent of the Minister of Fuel and Power to the development of four new power stations to their full capacity. The stations are East Yelland, near Barnstaple, Connah's Quay in Flint, Acton Lane, Willesden, and Brighton "B." The Minister's consent has already been given for the initial installations of plant in these stations which, with the exception of Brighton "B", will each have a total installed capacity of 180,000 kW when completed, made up of six 30,000 kW turbo-alternator sets. The total installed capacity of Brighton "B" when completed will be 330,000 kW, made up of four 52,500 kW sets and two sets of 60,000 kW. The further construction work now sanctioned will be spread over a number of years, no dates having yet been fixed for the completion of the stations.

New Super-grid Network

Work has been commenced by British Insulated Callender's Construction Co., Ltd., on the first section of Britain's new 275 kV super-grid network. A start was made on tower foundations on 18th June, and erection of the first tower superstructure began on 5th July, for completion on 7th July. This tower is unique in that it is the first in this country to be erected for a 275 kV line, and its construction marks the first step in the B.E.A. scheme to reinforce the existing grid network.

Yorkshire Board's Headquarters

Last week Lord Citrine, chairman of the B.E.A., paid a visit to the Yorkshire Electricity Board's headquarters at Scarcroft, Leeds, to open the final extensions of the offices. At the invitation of Mr. W. M. Lapper, chairman of the Board, he unveiled

Lord Citrine officially opening the chief officers' gate at the Yorkshire Board's headquarters. With him in the photograph (left to right) are Messrs. J. M. Dodds, E. Van Ham, A. Haselhurst and S. R. Siviour

a bronze plaque, with the Board's monogram executed in colour, commemorating the occasion. The archway where the plaque is fixed is at the eastern boundary of the original Scarcroft Lodge, erected in 1830, and the new building extending eastwards has been erected to complete the headquarters accommodation. After lunching in the staff dining hall, Lord Citrine, who was accompanied by Lady Citrine, inspected the extensions and officially opened a wrought iron gate which in its design displays the initials of the four chief officers of the Board, and is accordingly known as the chief officers' gate.

Islington Change-over

The London Electricity Board is applying to the Minister of Fuel & Power for consent to alter the supply in the area formerly served by the Islington Borough Council under the Islington Electric Lighting Order, 1893, from single-phase 100, 200 and 400 V to three-phase 415 V and single-phase 240 V.

New Clarence Dock Chimney

The reinforced concrete barrel for the new No. 3 chimney at Clarence Dock power station (B.E.A. Merseyside and North Wales Division) has been completed and the brick lining is now within a few feet of the top.

Electricity Only

Guildford Housing Committee has recommended the Council to adhere to its existing policy of installing only electricity in houses at Bushy Hill.

Wythenshawe District Heating

In our issue of 21st April we reported that differences between the Manchester Corporation and the British Electricity Authority upon the question of the price to be paid by the B.E.A. for electricity generated in connection with the projected Wythenshawe district heating scheme had been cleared up. At the same time it was said that the Corporation held the view that because of the national importance of the scheme the Government should guarantee it against loss.

Last week the case for a "substantial" Government grant was put to the Ministries of Health and of Fuel and Power, but the Manchester representatives were unable to obtain any promise of assistance.

Councillor J. E. Fitzsimons, chairman of the Wythenshawe Estate Committee, who headed the delegation, stated after the meeting that delay, which was the Government's fault, had resulted in the cost of the proposed scheme rising from £2,500,000 to £5,250,000. Thus the average charge to the householder would increase from 5s 1d to 8s 9d a week. Councillor Fitzsimons is reported by the *Manchester Guardian* as saying: "All that remains now is for the Ministry to consult the British Electricity Authority, who have consistently absented themselves from appeals for assistance and so indicated that they resent the Manchester Corporation making this development." The meeting, which took place last week, had been asked for on 17th August last year. "During the interval the Ministries have had every opportunity of drawing the British Electricity Authority into their discussions. Now they have promised to approach the B.E.A."

New Zealand Projects

A report on the progress being made on a number of hydro-electric projects in the South Island has been given by the New Zealand Minister of Works, Mr. Goosman. In the Nelson district, he said, work was going ahead on the expansion of the Cobb station, the capacity of which is to be stepped up from 12,000 to 32,000 kW. At Braeburn, also in Nelson, investigations were being made into a proposed tunnel from Lake Rotoroa through to the Mangles River to divert water to a power house on the river, providing a new source of power for the Nelson and West Coast districts. The power station on the Tekapo river was nearly finished, and investigations covering proposed extensions to the Waitaki power station had been completed. Discussing the Roxburgh project, Mr. Goosman said that the construction of the diversion channel to carry the river while the dam was being built was progressing well. A large temporary village, to accommodate 1,500 workers, was well under way.

"Civils" Conversazione

At the annual conversazione of the Institution of Civil Engineers, held in London last week, there was the customary exhibition of engineering models and scientific apparatus. These included a model of the B.B.C. 750ft television mast at Sutton Coldfield, and another of the 100 kW wind-driven generator which is to be erected for the North of Scotland Hydro-Electric Board under the auspices of the E.R.A. at Costa Hill, in the Orkneys. There was also a diorama and scale model, shown by Kennedy & Donkin and Sir Alexander Gibb & Partners, of the 150 MW Owen Falls hydro-electric scheme on the White Nile, near Lake Victoria, Uganda. Other items of electrical interest included apparatus for recording earth pressures, an electrical analogue of heat conduction, a demonstration of the application of ultrasonics to weld inspection and a display of quartz crystals as used in telephone circuits and for timekeeping.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

The London Electric Wire Co. & Smiths, Ltd.—Presiding at the annual meeting held on 28th June, Mr. W. J. Terry (chairman and managing director) said that generally speaking the raw materials in which they were interested had been in better supply. The world price of electrolytic copper was now linked with the f.a.s. New York quotation. At the close of 1949 the controlled price in this country was £153 per ton, and had now risen to £186 per ton. This unprecedented price was threatened with a further advance upon the expected reimposition of the import duty on copper into the United States if the home marked remained linked with the American market.

During the first part of 1949 orders fluctuated and for a period remained at a low level. This was particularly marked in the case of the finer insulated wires which were largely used in the manufacture of radio apparatus and domestic electrical appliances, the sales of which were severely restricted by purchase tax. During 1950, however, there had been a marked improvement in the orders received. The difficulties in respect of import licences in some overseas markets still remained. Nevertheless, their export sales were substantially increased during 1949 as compared with the previous period.

With the change-over from the sellers' market to the buyers' market there was keen competition for the business available. Increasing competition was now being felt from European countries previously suffering from the effects of war, while both Germany and Japan were now becoming serious competitors in the world markets. The need to plough back profits into business was greater than ever to-day in order to retain a sound financial position, and it was for this reason that they proposed that a further £200,000 be added to general revenue reserve. So far they had been able to finance necessary extensions and plant additions, although to meet contemplated developments further money might be required in the not too distant future.

The Telephone Manufacturing Co., Ltd., held its annual meeting on 3rd July, Mr. F. T. Jackson (chairman and managing director) presiding. In his circulated statement the chairman said that bearing in mind that they were newcomers to the export market, he considered their achievements satisfactory. Direct exports constituted 30 per cent of their output, and some part of their sales to home customers also was for incorporation in equipment for export. Direct export orders during the year represented 59 per cent of the total orders received, and for the first three months of the current year this percentage had increased to 67. Their sales of Carpenter relays continued to progress and the British Post Office was now specifying them for certain applications. They had also been successful in arranging distribution in the United States. Their long-term prospects were bright, but the immediate future gave cause for some concern. Keener prices and the increased cost of materials arising from devaluation would affect their figures for the current year. Trading results, so far, however, were satisfactory.

Scottish Cables, Ltd., reports a trading profit for the year ended 30th April last of £273,901, as compared with £254,060 for 1948-49. After deducting profits tax and income tax £134,040, and depreciation and auditors' remuneration, £24,506, there is a balance of £115,355, to which is added £17,575 brought in, making £132,930 available. General reserve receives £65,000, and it is proposed to pay a final ordinary dividend of 20 per cent, again making 30 per cent for the year. The balance carried forward is £21,730.

Walsall Conduits, Ltd., reports a group trading profit wholly attributable to members of the holding company of £311,304 for 1949, as compared with £332,600 for 1948. It is proposed to pay a final dividend of 35 per cent, plus a bonus of 15 per cent, maintaining the distribution for the year at 70 per cent. The balance carried forward is raised from £277,452 to £347,933.

The Hackbridge & Hewittic Electric Co., Ltd., reports a group profit, after providing £158,000 for United Kingdom taxation, of £135,016 for the year ended 31st March last, as compared with £74,310 for the preceding year. General reserve receives £57,500 and directors' pensions £5,000. It is proposed to pay a final ordinary dividend of 11 per cent (against 8½ per cent), making 15 per cent for the year (against 12½ per cent). The balance carried forward is £37,491 (against £27,728 brought in).

J. Stone & Co., Ltd., report a consolidated trading balance for 1949 of £1,059,042, as compared with £870,347 for

1948, to which is added investment income of £27,788, making £1,086,830. After deducting depreciation £103,932, taxation £517,629, and other charges, there is a net profit of £423,303 (against £352,596), plus recovery from war damage and other expenditure previously written off of £27,775. The parent company's trading balance is £907,293 (against £695,362), and the net profit £336,486 (£254,283). General reserve receives £50,000, contingency reserve £100,000, and other reserves £99,194. The final dividend on the ordinary and "A" ordinary is 7½ per cent, again making 12½ per cent for the year. The consolidated balance carried forward is £639,172 (against £550,908 brought in).

E. K. Cole, Ltd., reports a net profit for the year ended 31st March last of £100,681, as compared with £92,600 for the preceding eighteen months. It is proposed to pay a final dividend of 12 per cent, less tax, making 20 per cent for the year (against 30 per cent for the previous eighteen months).

Ward & Goldstone, Ltd., report a profit for the year ended 31st March last, after deducting all charges, including £152,248 for United Kingdom taxation, of £143,166, as compared with £108,080 for 1948-49. Reserve for future taxation receives £30,000, and it is proposed to pay a final dividend of 24 per cent on increased capital (against 30 per cent), making 44 per cent for the year (against 50 per cent on the old capital).

Hick, Hargreaves & Co., Ltd., report a profit for the year ended 31st March last, after providing £102,110 for taxation, of £129,481, subject to audit, as compared with £123,817 for the previous year. The final dividend is 8 per cent, again making 10 per cent for the year.

Johnson, Matthey & Co., Ltd., report a group net profit for the year ended 31st March last of £897,366, as compared with £260,380 for the preceding year. The proposed final ordinary dividend is 9 per cent, making 12 per cent, less tax, for the year (unchanged). The share of the group profit attributable to the holding company is £853,481.

The Dubilier Condenser Co., Ltd., is paying an unchanged dividend for the year of 20 per cent.

The Electric & General Investment Co., Ltd., are paying an unchanged dividend for the year of 15 per cent.

Pye (Ireland), Ltd., proposes to pay a final dividend of 15 per cent, again making 20 per cent for the year.

Ericsson Telephones, Ltd.—It is reported that Helbert, Wagg & Co., have placed a total of 580,000 ordinary 5s stock units of Ericsson Telephones, a proportion of which will be available in the market.

NEW COMPANIES

Brown (Llandudno), Ltd.—Registered 14th June. Capital £10,000. Manufacturers and repairers of and dealers in wireless and television sets, accessories and apparatus, etc. Directors: A. Brown and C. E. Brown. Regd. office: Midland Bank Chambers, Lloyd Street, Llandudno.

Thorpes of Gosforth, Ltd.—Registered 13th May. Capital £3,000. General electrical engineers, electrical installation contractors, etc. Directors: E. Thorpe, Mrs. Marjorie Thorpe and E. Thorpe, Jnr. Regd. office: 14, Grey Street, Newcastle-on-Tyne, 1.

Shoplighting, Ltd.—Registered 8th June. Capital £100. Electricians, mechanical engineers and manufacturers, workers and dealers in electrical apparatus, etc. J. S. Spreckley is permanent governing director. Regd. office: 21, Phoenix Place, W.C.1.

S. M. Spain (Bromsgrove), Ltd.—Registered 9th June. Capital £7,000. Electricians, radio, television and mechanical engineers, etc. Directors: S. M. Spain, Mrs. Gladys F. H. Spain and J. L. H. Layton. Regd. office: 81, High Street, Bromsgrove, Worcs.

Art Electric, Ltd.—Registered 14th June. Capital £100. Manufacturers of and dealers in electric fittings, lamps, etc. Subscribers: J. D. Finesilver and G. Bernard. Regd. office: 63a, Great Russell Street, W.C.1.

Nore Electric Co., Ltd.—Regd. 17th June. Capital £5,000. Directors: A. R. Chance, and C. L. Story. Regd. office: 41, Alexandra Street, Southend-on-Sea.

Edwin Brooks, Ltd.—Regd. 16th June. Capital £2,000. To acquire the business of an electrical engineer and dealer in radio apparatus carried on by E. Brooks at St. Annes-on-Sea. Directors: E. Brooks and D. Tolson. Regd. office: 9, Alexandra Drive, St. Annes-on-Sea, Lancs.

INCREASE OF CAPITAL

E. Shipton & Co., Ltd.—Increased by £44,000, in £1 7 per cent cumulative 2nd preference shares, beyond the registered capital of £6,000.

BANKRUPTCIES

W. L. Kirby, trading as Borough Electric Co., 24, Delafield Road, London, S.E.7, electrical engineer, lately carrying on business at Dornberg Works, Dornberg Road, Blackheath, S.E.3.—Trustee, Mr. M. G. Hacker, 18, Maddox Street, London, W.1, appointed 26th June.

FINANCIAL SECTION

STOCKS and SHARES

THE check to confidence and business from which Stock Exchange markets suffered on the development of the Korean crisis, and to which reference was made here last week, has continued to exert a depressing influence. Evidence of real selling, as distinct from an automatic marking down of prices, made itself manifest at the beginning of this week, though the hand of the bargain-hunter was not entirely lacking.

In the accompanying price lists, the comparison of present quotations with those of a month ago conceals to some extent the reaction in the last part of the month. In the first three weeks of June, industrial markets were continuing quite vigorously to benefit from the all-round revival of business confidence which originated around Whitsuntide. In many cases, the political jolt resulted in little more than the loss of previous gains. It can be said that at least during the first week of the crisis, industrial shares showed commendable calmness. A helpful influence has been the further weakening of the case for dividend limitation as a result of the T.U.C.'s statement about the rigid wage restraint policy.

Prices on the Month

The outstanding feature in the share list of prices, as compared with a month ago, is a rise of about 10s in Electric Construction, on the increase in the dividend from 12½ to 15 per cent. This came as a refreshing surprise and the quotation held the greater part of this rise, at 57s 6d. Aron Electric, with a rise of 6s 3d to 41s 3d, also stand out conspicuously. Other advances worthy of attention have occurred in Lucas, Hoover, General Electric, Walsall Conduits and Westinghouse Brake. A number of others showed gains ranging from 6d to 2s 6d. The falls include Tube Investments, Calcutta Trams, Calcutta Electric and Aberdare Cables.

Deal in Ericsson Shares

A placing has been arranged in this country of 580,000 Ericsson Telephone Company 5s ordinary shares, which formed the major part of the shareholding of the Stockholm company of Ericsson. This company retains an interest believed to be of still substantial proportions. Some of the transferred shares are to be made available to the public. According to market reports, they will be offered at a price not below 46s, and the effect of this was to bring down the price of the existing shares to a fraction below that figure. On the strength of the conspicuously conservative dividend, the shares have long been a favourite in the electrical equipment market, as the yield of less than 4 per cent gross, witnesses.

Company News

Walsall Conduits' final distribution of 50 per cent recalls that since its registration in 1936 the company has paid in each year a 55 per cent dividend with the addition of a 15 per cent bonus on the last four occasions. Profits for 1949 are shown in the preliminary statement to have experienced a minor recession, but still appear to cover the ordinary dividend and bonus 2½ times over. The 1s shares of Dubilier Condenser are quoted about 2s 6d, to yield 8 per cent on the dividend recently maintained at 20 per cent. Profits are well up on the previous figure, and a 3-for-5 capital bonus is proposed. Ward & Goldstone's final dividend of 24 per cent is equivalent to the 30 per cent paid last year before the 25 per cent capital bonus.

Hackbridge & Hewittic

External affairs suppressed the market response which might otherwise have been expected to follow the final dividend declaration and preliminary profits statement of Hackbridge & Hewittic Electric. Profits after tax, have risen by over 80 per cent, and ordinary shareholders are permitted a modest share of the increase in the shape of an extra 2½ per cent in the distribution. This makes a total of 15, against 12½, per cent for the year. At 14s the company's 5s shares were practically unmoved by the event, although they had advanced about a florin in anticipation.

Scottish Cables' Results

A useful increase in Scottish Cables' profits for 1949-50 leaves a net figure of £115,350 available for dividends and reserves. Preference dividend takes under £5,000, so that there is plenty to spare for the repetition of the 30 per cent dividend, which requires £41,250. The 4s shares are normally a quiet market, the price having deviated this year only a few pence either side of the present quotation of 22s 6d. They pay £5 6s 8d per cent on the money from the present rate of dividend, which has been paid, from rising earnings, since the company was made public in 1948.

Electrical Investments

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 30 June 1950	Month's Rise or Fall	Yield p.c.
Overseas Electricity Companies					£ s. d.
Atlas Elec. ...	2	2½	14/6	+3d.	3 9 0
Calcutta Elec. ...	6†	6†	22/-	−2/-	5 9 1
Cawnpore Elec. ...	13	10	47/6	—	4 4 3
East African Power	7	7	34/9	—	4 0 7
Jerusalem Elec. ...	5	6	13/6	+6d.	—
Madras Elec. ...	8	5	28/9	−1/3	3 9 7
Nigerian Elec. ...	10	10	30/9	—	6 10 1
Palestine Elec. "A"	Nil	5†	22/-	−6d.	4 11 0
Perak Hydro-Elec.	Nil	Nil	8/6	−6d.	—
Whitehall Inv. Pref.	—	6	23/6	—	5 4 4
Equipment and Manufacturing					
Aberdare Cables ...	15	20	55/-	−2/6	7 5 6
Aron Elec. Ord. ...	15	15	41/3	+6/3	7 5 8
Assoc. Elec. Ord. ...	15	15	76/6	+2/9	3 18 6
Automatic Tel. & El.	12½	12½	58/9	—	4 5 0
Babcock & Wilcox	15	15	62/6	+2/6	4 16 0
Baldwin, H. J (2/-)	25	25	5/9	—	8 13 10
British Aluminium	10	10	40/-	+1/-	5 0 0
B.I. Callender's ...	6⅝	6⅝	31/3	−2/-	4 5 4
British Thermostat (5/-)	25	30	27/6	+1/3	5 9 1
British Vac. Cleaner (5/-)	20	20	11/6	—	8 13 10
Brush Ord. (5/-) ...	10	10	6/-	−9d.	8 6 8
Burco (5/-) ...	35	35	20/-	−9d.	8 15 0
Chloride El. Storage	20	12½*	52/6	+3/-	3 16 3‡
Cole, E. K. (5/-) ...	20	20	17/-	+9d.	5 17 8
Cossor, A. C. (5/-)...	Nil	Nil	8/6	—	—
Crabtree (10/-) ...	17½	17½	37/6	+2/6	4 13 4
Crompton Parkinson Ord. (5/-) ...	22½	22½	12/-	—	4 13 9
De La Rue (5/-) ...	50	50	23/3	—	10 15 0
Decca (1/-) ...	112½	112½	14/6	−1/3	7 15 0
E.M.I. (10/-) ...	8	8	22/6	−⅛	3 11 1
Electrical Components (5/-) ...	20	20	11/3	—	8 17 10
Elec. Construction	12½	15	57/6	+10/6	5 4 2
Enfield Cable Ord.	7½	7½	30/-	−2/6	5 0 0
English Electric ...	10	10	45/6	+1/-	4 8 0
Ericsson Tel. (5/-)...	20†	20†	46/3	. —	2 3 3
Ever Ready (5/-)	40	35	28/6	+1/6	6 2 10
Falk Stadelmann ...	15	15	36/3	—	8 5 6
G.E.C. Ord ...	17½	17½	82/6	+5/-	4 5 0
General Cables (5/-)	50	50	16/3	—	9 4 8‡
Greenwood & Batley	15	15	40/-	+1/9	7 10 0
Hackbridge Cable (5/-)	—	20	12/-	—	8 6 8
Hackbridge Hewittic (5/-)	12½	15	14/-	+1/6	5 7 2
Hall Tel. Acc. (10/-)	10	10	14/-	—	7 2 10
Heatrae (2/-) ...	12½	12½	4/-	—	6 5 0
Henleys (5/-) ...	20	20	22/6	—	4 9 0
Hoover (5/-) ...	40	45	44/-	+3/3	5 2 0
Intl. Combustion (5/-)	37½	37½	16/-	+1/-	4 13 9‡
Johnson & Phillips	15	15	60/-	−1/3	5 0 0

Company	Dividend Previous	Dividend Last	Middle Price 30 June 1950	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (continued)					£ s. d.
Lancashire Dynamo	22½	22½	97/6	+2/6	4 12 3
Laurence, Scott (5/-)	12½	12½	13/6	—	4 12 7
London Elec. Wire	10	10	47/6	+1/3	4 4 2
J. Lucas	17½	17½	30/-	+3/-	3 15 2‡
Mather & Platt ...	11	11	36/3	—	4 1 0‡
Metal Industries ...	10	10	43/9	+3/-	4 11 4
Mid. Elec. Mfg. ...	35	12½*	55/-	+1/3	4 11 0
Murex	20	20	45/6	+6d.	4 8 0‡
Newman Ind. (2/-)	17½	10	3/-	—	6 13 4
Oldham & Son (1/-)	60	60	5/6	—	5 10 0‡
Plessey (5/-) ...	20	20	16/3		6 3 0
Parsons C. A. ...	12½	15	66/3	+1/3	4 10 4
Pye Deferred (5/-)	25	25	35/-	+2/6	3 11 5
Radio & Tel. (2/-)	25	—	9d.	—	—
Revo (10/-) ...	27½	27½	42/6	−6d.	6 9 5
Reyrolle	12½	15	68/9	+2/6	4 7 3
Scophony Baird (1/-)	—	—	1/9	−9d.	—
Scot. Cable (4/-) ...	30	30	22/6	−6d.	5 6 8
Siemens Ord ...	7½	7½	31/3	—	4 16 0
Switchgear & Cowans (5/-)	20	20	15/-	—	6 13 4
T.C.C. (10/-) ...	15	15	33/9	—	4 8 9
T.C. & M. ...	10	9*	37/6	+6d.	4 5 4‡
Telephone Mfg. (5/-)	9	10	10/-	+6d.	5 0 0
Thorn Elec. (5/-) ...	25	20	17/6	+1/3	5 14 3
Tube Investments	25	25	6	−2/6	4 3 4
Vactric (5/-) ...	Nil	Nil	7/6	—	—
Veritys (5/-) ...	5	5	3/6	—	7 2 10
Walsall Conduits (4/-)	70	70	58/9	+3/9	4 15 3
Ward & Goldstone (5/-)	50	44*	35/-	—	5 14 3‡
Watford (2/-) ...	20	20	6/6	+6d.	6 3 0
Westinghouse Brake	14	14	60/-	+3/9	4 13 4
West, Allen (5/-) ...	10	10	9/-	+3d.	5 11 1
Transport and Communications					
Anglo-Am. Tel: Pref.	6	5 13/20	100½	—	5 12 3
Def.	—	—	18	−2	—
Anglo-Portuguese	8	8	25/6	—	6 5 6
Brit. Elec. Traction: Def. Ord. ...	50	32½*	445	−5	5 1 0‡
Calcutta Trams ...	Nil	6†	24/6	−3/-	4 18 0
Cape Elec. Trams	6	6	17/6	−6d.	—
Cable & Wireless: Ord.	—	—	93	—	—
4% Loan ...	—	—	101	+½	3 19 8
Globe Tel. & Tel. Ord.	5†	5†	46/3	+1/3	—
Great Northern Tel. (£10)	11	7	13½	−1	5 5 8
Inter. Tel. & Tel. ...	Nil	Nil	23	−4½	—
Marconi Marine ...	7½	7½	24/3	−1/6	6 3 8
Oriental Tel. Ord.	10	16	42/6	−2/6	7 10 6
Telephone Props. ...	6	6	18/9	+1/3	6 8 0
Tele. Rentals (5/-)	10	10	11/6	+1/-	4 7 0

* After capital bonus.
† Dividends are paid free of Income Tax.
‡ Yield adjusted to capital bonus issue.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

2272. Stevens, A. H. (Submarine Signal Co.).—Apparatus for the transmission and reception of compressional waves for sub-aqueous signalling. 7th February, 1944. (Convention date not granted.) (641640.)

1945

24311. British Thomson-Houston Co., Ltd.—Ignition units comprising a combined spark-plug and transformer. 19th September, 1945. (641710.)

1946

4533. Carrier Engineering Co., Ltd.—Air conditioning and ventilation. 13th February, 1946. (641712.)

14747. Carrier Engineering Co., Ltd.—Air heating or cooling systems. 15th May, 1946. (641713.)

20021. Philips Lamps, Ltd.—Frequency-modulation circuits. 4th July, 1946. (641543.)

30687. Macoun, V.—Instantaneous switching devices for single-pole and multi-pole circuit-breaking and circuit-making switches. 15th October, 1946. (641716.)

30688. Macoun, V.—Multiphase switches. 15th October, 1946. (641645.)

30991. Broad, D. A. G.—Electric-discharge devices especially to cathode-ray tubes. 26th September, 1947. (641467.)

33047. Ferrand, L.—Fused salt electrolytic cells. 6th November, 1946. (Cognate application 33048, 3rd June, 1946.) (Addition to 637579.) (641551.)

34524. Western Electric Co., Inc.—Piezo-electric crystals. 21st November, 1946. (641469.)

37772/3. Western Electric Co., Inc.—Piezo-electric crystal elements. 23rd December, 1946. (641470/1.)

37950. Marconi's Wireless Telegraph Co., Ltd.—Sound translating devices. 28th December, 1946. (641718.)

1947

3157. Butler, Ltd., H., and Butler, H.—Electrically operated indicating and measuring instruments. 3rd February, 1948. (641649.)

3323. Marconi's Wireless Telegraph Co., Ltd., and Neilson, P. J.—Telegraph receivers. 19th August, 1947. (641552.)

4735. White, E. L. C. — Thermionic valve circuits. 22nd January, 1948. (641599.)

8132. British Thomson-Houston Co., Ltd.—Vacuum-tight seals. 25th March, 1947. (641720.)

8973. General Electric Co., Ltd., Taylor, L. A., Wagstaff, C. R., Dean, P., and Turner, H. C.—Apparatus using a magnetizable recording medium in the form of a tape or wire. 2nd April, 1948. (641721.)

9530. Goodmans Industries, Ltd., and Chapman, C. T.—Loudspeakers or microphones. 10th May, 1948. (641651.)

13309. Distillation Products, Inc.—Use of electric glow discharges for cleaning and degassing processes. 17th May, 1947. (641655.)

13329. Pye, Ltd., Lawson, D. I., and Fuller, D. Q.—Apparatus for detecting irregularities, flaws or the like in electrically conducting bodies. 18th May, 1948. (641657.)

14258. Comptoir des Cendres et Metaux Precieux, and Klein, S. — High-temperature electric resistance oven. 29th May, 1947. (Cognate applications 14259, 20th July, 1946, and 14260, 14th March, 1947.) (641602.)

14751. Electro Methods, Ltd., and Willheim, R.—Electric control arrangements employing reactors on saturable cores of magnetic material. 1st June, 1948. (641603.)

15989. Bendix Aviation Corporation.—Propagation of radio waves through a tunnel. 17th June, 1947. (641474.)

21912. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. — Manufacture of electric-discharge tubes. 8th August 1947. (Cognate application 21913, 19th June, 1946.) (641481.)

22085. Sylvania Electric Products, Inc.—Luminescent material and method of preparing the same. 14th January, 1948. (641663.)

22871. Bird Electronic Corporation.—High-frequency coaxial circuit components. 18th August, 1947. (641607.)

24479. English Electric Co., Ltd., and Tagg, G. F.—Eccentricity measuring instruments. 3rd September, 1948. (641732.)

25537. Standard Telephones & Cables, Ltd.—Sound reproduction devices. 19th September, 1947. (641668.)

25619. Metropolitan-Vickers Electrical Co., Ltd., and Alexander, G. W.—Safety devices combined with electric signalling systems for mine hoists and the like. 15th September, 1948. (641488.)

26056. Metropolitan-Vickers Electrical Co. Ltd., and Mandl, A.—Variable-speed alternators. 13th October, 1948. (641735.)

26523. Measurement, Ltd., and Hewlett, S. J.—Electrical impulse transmitters. 22nd July, 1948. (641670.)

26594. British Thomson-Houston Co., Ltd.—Magnetrons. 2nd, October, 1947. (641489.)

26697. Bendix Aviation Corporation.—Electrical generator systems for effecting protection from excessive output voltage in the event of a fault in the regulator for the generator. 3rd October, 1947. (641671.)

27808. Standard Telephones & Cables, Ltd.—Electric condensers. 17th October, 1947. (641672.)

29102. Standard Telephones & Cables, Ltd.—Method of fusing thermoplastic tubes by high-frequency. 31st October, 1947. (641611.)

29126. Cossor, Ltd., A. C. and Whiteley, J. W.—Electrical bridge networks. 13th October, 1948. (641498.)

30391. General Electric Co., Ltd., and Caldwell, J. T.—Voltage indicating apparatus. 2nd November, 1948. (641613.)

30459. Lindblad, K. B.—Automatic control of the magnetic flux in electric generators, particularly bicycle generators. 17th November, 1947. (641614.)

30932. Standard Telephones & Cables, Ltd., and Kelly, R.—Automatic voltage regulating equipment. 21st November, 1947. (Addition to 629542.) (641501.)

31123. Urmenyi, L.—Device for measuring the eccentricity of coated or covered cables, wires and rods. 24th November, 1948. (641674.)

31583. Furzehill Laboratories, Ltd., Smith & Sons (England), Ltd., S., and Milsom, F. R.—Voltage stabilizers for direct-current supplies. 3rd November, 1948. (641567.)

32857. Sperry Gyroscope Co., Ltd., Sedgfield, H. B., and Downes, F. A.—Electrical voltage regulating systems for rotary alternating electric generating systems. 19th November, 1948. (641742.)

33288. Standard Telephones & Cables, Ltd., Dunn, R. H., and Warden, F. W.—Telegraph transmitters. 10th December, 1948. (641572.)

33641. Metropolitan-Vickers Electrical Co., Ltd.—Air- or gas-blast electric circuit interrupters. 19th December, 1947. (641743.)

1948

428. Standard Telephones & Cables, Ltd., Cleaver, R. F., and Gray, T. D.—Electric signal modulators. 31st December, 1948. (641505.)

517. Ega Electric, Ltd., and Kilminster, G.—Electric switchgear. 7th January, 1949. (641506.)

520. Moravian Electrical Engineering Works National Corporation, and Hak, J.—Starting arrangement for electric motors. 7th January, 1948. (641746.)

1746. General Electric Co. Ltd., and Foot, J. B. L. —Thermostatically controlled electric ovens. 20th January, 1949. (641683.)

3647. Wiegand Co., E. L.—Electric heating units. 7th February, 1948. (641693.)

3860. Wiegand Co., E. L.—Electric heating units. 10th February, 1948. (Addition to 636658.) (641627.)

4241. Philips Electrical, Ltd.— — Circuits for the stabilization of the mean frequency of a frequency-modulated oscillation. 13th February, 1948. (Addition to (619139.) (641629.)

5257. Herbert, Ltd., A., Lloyd, A. H., and Jinman, C. H.—Electrically operated chucks for machine-tools. 23rd February, 1948. (641629.)

5730. Printer's Plant, Ltd. and Uffindell, R. H.— Solenoid-controlled electric switches. 28th February, 1949. (641751.)

5827. Siemens Bros. & Co., Ltd., Gee, F. J., and Hardman, T. K.—Starting devices for electric-discharge lamps. 25th February, 1949. (641631.)

5968. Director of Office of Technical Services, Department of Commerce.—Pulse generator circuits. 27th February, 1948. (641753.)

5969. Director of Office of Technical Services, Department of Commerce. Radio beacons. 27th February, 1948. (641700.)

6242. Sperry Corporation.—Electrical pulse generators. 28th February, 1948. (641512.)

6742. Rogers, D. W. W.—Electric magazine fuse boxes. 4th March, 1949. (641702.)

7968. Monitor Patent Safety Devices Ltd., and Stokoe, C. L.—Electric limit switches in connection with float apparatus. 10th March, 1949. (641514.)

8102. Gunning, M. F.—Power plants. 9th March, 1949. (641758.)

8704. Walter Instruments, Ltd., Noad, J. E. G., and Armstrong, C. J.—Electric press-button operated switches. 24th March, 1949. (641515.)

9045. Ward & Goldstone, Ltd., and Goldstone, S.— Electric plug-and-socket adaptor connectors. 31st March, 1949. (641516.)

11430. Svenska Aktiebolaget Broms-Regulator.— Acceleration and retardation control arrangement for electric-motor driven vehicles. 26th April, 1948. (641763.)

13705. Metropolitan-Vickers Electrical Co., Ltd., and Wood, L.—Flux meters. 4th March, 1949. (641764.)

15824. General Electric Co., Ltd., and Pitman, E. J. —Terminating devices for armoured electric cables. 13th June, 1949. (641638.)

16086. Westinghouse Electric International Co.— Turbine apparatus. 15th June, 1948. (641709.)

16626. Philips Electrical, Ltd.—Electric-discharge tubes. 21st June, 1948. (641581.)

17840. Chloride Electrical Storage Co., Ltd., and Barak, M.—Electric batteries or accumulators. 1st April, 1949. (641531.)

25019. British Thomson-Houston Co., Ltd.—Air conditioning units employing means for cooling the air. 24th September, 1948. (641538.)

29233. Sperry Gyroscope Co., Ltd., Sedgfield H. B., and Dawnes, F. A.—Regulating systems for electric motors. 10th November, 1948. (Divided out of 641742.) (641778.)

33645. British Thomson-Houston Co., Ltd., Morrison, S. J., and Brett, J. G.—Production of hollow glass bodies. 22nd November, 1949. (641588.)

East Midlands Consultative Council

THE method of carrying out load shedding was referred to by Mr. C. F. Freeman (Coventry) at a meeting of the East Midlands Consultative Council at Nottingham last week. He said that it had been the practice of the British Electricity Authority in the past to carry out load shedding by first reducing the voltage by 5 per cent. It now appeared that this practice had been discarded, and he asked whether it was the intention of the Authority to dispense entirely with the first stage of load shedding in the future. In reply, Mr. J. D. Findlay, the system operation engineer for the Area, assured members of the Council that the original practice would be reverted to as soon as the summer overhaul period had been completed.

The four local Committees of the Council submitted a report on the possibility of meter readers being given instruction to enable them to record, and submit to the proper quarter, consumers' queries and requests for information. It was agreed that the report should be sent to the Area Board.

A communication received from the Board with regard to shop-window lighting was discussed. It was noted that the Council's suggestion that shop-window lighting should be permitted after 5.30 p.m. had been submitted to the Central Authority after endorsement by the Area Board, and this matter was at present under active consideration by the Ministry of Fuel and Power and the Central Authority.

A resolution proposed by Mr. W. G. Coates (South Kilworth) on the subject of electricity charges received the support of the Council. It referred to the recent increases in fuel and transport costs and requested the Board to take all practicable steps to prevent a rise in the price of electricity to consumers. Mr. John Mould, deputy chairman of the Board, said that everything possible would be done in an endeavour to avoid increasing the cost of electricity. Whilst replying to the resolution, Mr. Mould indicated that the price of electricity at the present time was only 12 per cent above the 1938 level, and despite the increased charges for coal and essential materials the Board had managed during the first financial year to make a profit. He felt that the chairman of the Board would wish him to say that they had again, during the year ended 31st March, 1950, maintained themselves "on an even keel," and although he did not know what the surplus would be, he was almost certain that they would manage to "make ends meet" once more.

The draft second annual report of the Council was approved.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Cambridge.—East Anglian Regional Hospital Board. Applications are invited from firms for inclusion in an approved list of contractors for works including electrical installations. Board's architect, 33, Parkside, Cambridge.

Dundee.—August 1st. Corporation Waterworks Committee. Two electrically driven centrifugal pumps, complete with switchgear, etc., for Clatto pumping station. G. Little, engineer and manager, 17, City Square.

Luton.—22nd July. Corporation. Electrical installations in 422 Council houses. (See this issue.)

Newburn-on-Tyne.—U.D.C. Electrical installations in 84 houses on the Mount Pleasant estate, Throckley. J. A. Weatherley, U.D.C. surveyor.

Repton.—July 25th. R.D.C. Electrically driven pumping machinery in duplicate, for the northern area water scheme. Surveyor, The Poplars, Rolleston Road, Burton-on-Trent.

Southport.—12th August. Borough Council. Five sets of electrically driven, automatically operated, axial-flow-type pumps, of a total capacity of 31,250 gall/min, together with all accessories. Borough engineer, Town Hall.

Stretford.—July 15th. Borough Council. Street lighting installation (horizontal mercury lamps). A. H. Perry, borough surveyor, Town Hall.

Sunderland.—4th August. Corporation. Electrical installation at Bede Tower. (See this issue.)

Uganda.—31st July. L.v. cable installation for the Tororo Cement Works. (See this issue.)

Uruguay.—9th August. Usinas Electricas y Telefonos del Estado. Supply of single rate meters. (C.R.E. (I.B.) 57616/50. Ten/1386.)*
14th August. Telephonic carrier current equipment. (C.R.E. (I.B.) 57617/50. Ten/1389.)*

ORDERS PLACED

Bradford. — Corporation. Recommended. Work in connection with electrical installations at houses in Middle Lane, Clayton (£180).—H. Moore, Clayton.

Thornaby-on-Tees.—Town Council. Electrical installations in 44 new houses (£901).—Stewart and Son, Norton, Stockton.

Warrington.—Corporation. Rewiring borough treasurer's office (£474).—Merseyside and North Wales Electricity Board.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aldermaston.—Houses (100) for Ministry of Works; John Laing & Son, Ltd., builders, Bunns Lane, N.W.7.

Bakewell.—Houses (10), Eyam, for R.D.C.; Furniss & Hassall, Ltd., Great Longstone.

Bath.—Buildings at Newton Park, including 176 study bedrooms, lecturers' flats, accommodation for domestic staff, etc.; J. Owens, city engineer, Guildhall.

Bebington.—Houses (66), Brackenwood estate; borough surveyor.

Billingham-on-Tees.—Houses (60), Roseberry Road site, for the U.D.C.; Stephen Coates, Ltd., builders, Langburgh Place, North Ormesby, Middlesbrough.

Birmingham.—Renewal of electricity mains in east block at Selly Oak Hospital, Birmingham, extension of out-patients' department at Stafford General Infirmary, and conversion works at Pelsall Sanatorium; D. A. Goldfinch, architect to Birmingham Regional Hospital Board.
Houses (40), Bowman Road and Booth's Lane; H. J. Manzoni, city engineer, Civic Centre.
Primary school, West Heath; Peacock & Bewlay, architects, 83, Colmore Row.

Bradford.—Houses (408), Buttershaw estate (section C); city architect.

Bridgnorth.—Houses at Neenton, The Down, Erdington and Chelton; S. J. Yelland, surveyor to R.D.C.

Brighton.—Ambulance station (£16,500); borough engineer.
Junior and infants' school (£105,000), Coldean; schools architect.

Burnley.—Infants' school, Myrtle Bank; Quiggin & Gee, architects, 11, Old Hall Street, Liverpool.

Bury.—Houses (53), Cunningham Drive; J. E. France, Peel Street, Failsworth. Houses (30) at Littlewood No. 4 site; E. F. Davis, Ltd., Farnworth.

Corby.—Health centre for Northants C.C.; county architect, Northampton.

Derby.—Infants' school, Brackens Lane, Allenton; borough architect.
Fire station, Nottingham Road; Gee, Walker & Slater, Ltd., Derby.

Dewsbury.—Infants' school, North Road, Ravensthorpe; borough architect.

Dunstable.—Houses (26), Beecroft and Brewers Hill estates; borough surveyor.

Gosforth.—Houses (82), between Church Road and Church Avenue; U.D.C. surveyor.

Great Yarmouth.—Secondary modern school for girls, Beccles Road; F. Jackson, architect, 15, Regent Street.

Guildford.—Houses (118), Bellfields and Upfolds sites; borough engineer.

Hemel Hempstead.—Houses (68), Belswains Farm estate; borough surveyor, Market Square.

Heywood.—Houses (30), Rose Hill Street; borough surveyor.

Huddersfield.—Scheme for extension and development of Technical College (whole plan to cost £5,000,000); H. Nuttall, borough architect, High Street Buildings.

Leeds.—Flats (366), Tinshill Lane, Moortown East, Iveson Drive and Fearnville Road; city architect, Priestley House, Quarry Hill, Leeds, 9.

Lemington.—Factory additions for the Lemington Glassworks, Ltd.; Stephen Easten, Ltd., builders, Westgate Road, Newcastle-on-Tyne.

Liverpool.—Conversion of Kirby Hostel into 135 flats; Marshall Bros. (Builders), Ltd., 3, Salop Street.

Flats (30), Elham Grove; Tysons, Ltd., 3, Dryden Street.

Llanfairfechan.—Houses (35) for U.D.C.; R. J. Hughes, architect, Llanfairfechan.

London. — HOLBORN. — Eight-storey office block, Eagle Street and Red Lion Street; L. C. Norton, architect, 16, Clifford Street, W.1.

HAMPSTEAD.—Flats (46), laundry, etc., Burgess Hill site, for L.C.C.; G. E. Bright, architect, 35a, Thayer Street, W.1.

Newburn-on-Tyne.—Factory for Lemington Glassworks, Ltd.; S. W. Milburn & Partners, architects, 9, Esplanade, Sunderland.

Newport (Mon).—X-ray department for Royal Gwent Hospital F. R. Bates & Son, architects, Tredegar Chambers, Bridge Street.

Northallerton.—Public hall and swimming pool, rear of Bullamoor Road, for U.D.C.; surveyor, Urban Council Offices.

Northampton. — Houses (58), Sunnyside estate; borough architect.

Nottingham.—School, Padstow Road, Bestwood (£199,790); R. M. Finch, city surveyor, Guildhall.

Pontardawe.—Factory; Cambrian Dress Products, Ltd., 24, Great Titchfield Street, London, W.1.

Ryde (I.o.W.).—Practical block for Bishop Lovett School; Westridge Construction Co., Ltd., builders, 15, High Street.

Stafford.—Houses (130); Wm. Whittingham, Ltd., builders, Powlett Street, Wolverhampton.

Stone (Staffs).—New works at Cauldon, near Stone; Associated Portland Cement Manufacturers, Ltd., Portland House, Tothill Street, Westminster, S.W.1.

Sutton-in-Ashfield.—Primary school, Leamington Drive; Greenwoods (Mansfield), Ltd., Mansfield.

Tynemouth.—Primary school, Marden Avenue (£52,000); William Moss & Sons, builders, Scotswood Road, Newcastle-on-Tyne.

Houses (60), Lynn Road site; D. M. O'herlihy, borough engineer, 19, Howard Street, North Shields.

Uttoxeter.—Houses (22) at Bently Lane estate; O'Dair Bros., Ltd., Tean.

Waltham Cross.—Offices and depot, High Street, for Metropolitan Water Board; James Webb & Son, Ltd., builders, 326, St. John Street, E.C.1.

Workington.—Houses (52), Westfield estate extension; Handel Kay, borough surveyor, Stoneleigh, Park End Road.

Wrexham. — Factory, Marchwiel estate; British Celanese, Ltd., 22, Hanover Square, W.1.

High-Speed Motor Reversal

A METHOD of reversing a small electric motor in three to four milliseconds has been developed at the National Bureau of Standards in America to meet the need for the high-speed reversal of magnetic tapes in electronic digital computing machines. In this method the kinetic energy of the rotor, instead of being dissipated as heat in a brake during deceleration, is converted into potential energy in a spring, which is then used to accelerate the rotor rapidly in the opposite direction.

A two-phase 3,200 r.p.m. motor is used and the reversal spring comprises a steel torsion bar about 31in long and 3/16in in diameter. Only one phase of the motor is connected to the a.c. mains; thus the motor will rotate in the starting direction, either clockwise or counter-clockwise. The motor shaft is rigidly connected to one end of the torsion bar, which is equipped at the other end with two positive uni-directional clutches, one preventing clockwise and the other counter-clockwise rotation.

If the motor is rotating in the clockwise direction and the proper clutch is engaged, the adjacent end of the torsion bar is stopped, thereby bringing the rotor to a standstill in about 20 deg. The potential energy stored in the torsion bar is then returned to the rotor in the form of a counter-clockwise impulse. The motor reaches virtually full speed in the new direction within about two milliseconds.

In this experimental model the clutches are operated manually, but in normal use they will most likely be controlled by electromagnetic means. Although only a 1/75 h.p. motor has been used so far, it is anticipated that motors of all sizes could be reversed rapidly by this technique, the speed of reversal being limited only by the mechanical strength of the various parts. Moreover, by the use of suitable circuits, the rapid reversal of motors can be effected without producing large current surges in the electricity supply lines.